

INTERNATIONAL STANDARD

IEC
60335-2-42

Fourth edition
2000-03

**Safety of household and
similar electrical appliances –**

**Part 2-42:
Particular requirements for commercial electric
forced convection ovens, steam cookers and
steam-convection ovens**

Sécurité des appareils électrodomestiques et analogues –

*Partie 2-42:
Règles particulières pour les fours électriques à convection
forcée, les cuiseurs à vapeur électriques et les fours combinés
vapeur-convection électriques à usage collectif*



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International Electrotechnical Commission
Telefax: +41 22 919 0300

3, rue de Varembe Geneva, Switzerland
e-mail: inmail@iec.ch

IEC web site <http://www.iec.ch>



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

SAFETY OF HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES –**Part 2-42: Particular requirements for commercial electric forced convection ovens, steam cookers and steam-convection ovens**

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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- 6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60335-2-42 has been prepared by subcommittee 61E: Safety of electrical commercial catering equipment, of IEC technical committee 61: Safety of household and similar electrical appliances.

It forms the fourth edition of IEC 60335-2-42 and replaces the third edition, published in 1994, amendment 1 (1996) and amendment 2 (1998). It also replaces IEC 60335-2-46, published in 1986 and its amendment 1 (1990).

The text of this standard is based on the third edition, amendments 1 and 2, and the following documents:

FDIS	Report on voting
61E/354/FDIS	61E/367/RVD

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

This part 2 is to be used in conjunction with the latest edition of IEC 60335-1 and its amendments. It was established on the basis of the third edition (1991) of that standard.

This part 2 supplements or modifies the corresponding clauses in IEC 60335-1, so as to convert it into the IEC standard: Safety requirements for commercial electric forced convection ovens, steam cookers and steam-convection ovens

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

NOTE 1 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 2.

NOTE 2 Subclauses, figures and notes which are additional to those in part 1 are numbered starting from 101.

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



SAFETY OF HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES –

Part 2-42: Particular requirements for commercial electric forced convection ovens, steam cookers and steam-convection ovens

1 Scope

This clause of part 1 is replaced by:

This standard deals with the safety of electrically operated commercial **forced convection ovens, steam cookers, steam-convection ovens** and, exclusive of any other use, **steam generators**, not intended for household use, their **rated voltage** being not more than 250 V for single-phase appliances connected between one phase and neutral and 480 V for other appliances.

NOTE 1 These appliances are used for example in kitchens such as in restaurants, canteens, hospitals and commercial enterprises such as bakeries, butcheries, etc.

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

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

NOTE 2 Attention is drawn to the fact that

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

This standard does not apply to

- appliances where the cooking process is not only carried out by direct steam contact but also with the food partially or completely immersed in a liquid;
- 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);
- continuous process appliances for the mass production of food;
- microwave ovens;
- appliances with electrode heaters.

2 Definitions

This clause of part 1 is applicable except as follows.

2.2.4 Addition:

NOTE The **rated power input** is the sum of the power inputs of all the individual elements in the appliance which 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**.

2.2.9 Replacement:

normal operation: Operation of the appliance under the following conditions:

Dry heat mode

The appliance is operated with all the shelves or the shelf trolley in position according to the manufacturer's instructions but with no load. The controls are set so that the mean value of the temperature over the **thermostat** cycle at the geometric centre of each usable space in the interior of the oven is maintained at $220\text{ °C} \pm 4\text{ °C}$. Stepped controls are set so that this temperature is $220\text{ °C} \pm 15\text{ °C}$.

For ovens which are unable to attain a temperature of 220 °C , the controls are set at the maximum.

For ovens which are capable of attaining temperatures in excess of 270 °C , the controls are set so that the mean value of the temperature is $50\text{ °C} \pm 4\text{ °C}$ below the maximum temperature attainable.

Steaming only mode

The appliance is operated in accordance with the manufacturer's instructions with all controls intended to be operated by the user adjusted to their maximum setting until reaching operating temperature. They are then readjusted, if possible, to the lowest setting that maintains that temperature.

Appliances with **steam generators** intended to be filled by hand or by a manually operated tap are filled to the **indicated level** on the **steam generator**.

Appliances with **steam generators** intended to be filled automatically are connected to a water supply having the pressure designated by the manufacturer. Where the manufacturer specifies a range of pressures, the pressure is adjusted to give the most unfavourable conditions.

The incoming water is maintained at

- $15\text{ °C} \pm 5\text{ °C}$ in the case of appliances intended for connection to a cold water supply;
- $60\text{ °C} \pm 5\text{ °C}$ or the temperature indicated in the instruction sheet, whichever is the higher, in the case of appliances intended for connection to a hot water supply only.

NOTE 1 If the appliance is intended for connection to either a hot or cold water supply, the temperature of the water is that which gives the most unfavourable results.

Lids, doors, and covers are in position and closed.

The **cooking compartment** of the appliance contains a water load, initially at $15\text{ °C} \pm 5\text{ °C}$, comprising 0,5 l/kg of the manufacturer's declared maximum food load. The water load is evenly distributed between the shelves or pans.

NOTE 2 Since pans may be perforated to allow for circulation of steam, the water load may be contained in suitable containers evenly distributed over the shelves or pans.

Combination mode

The appliance is operated as for the steaming only mode but with the forced convection fan/s and elements for heating the **cooking compartment** on and the temperature controls set as for the dry heat mode.

In all the above cases, motors incorporated in the appliance are operated in the intended manner under the most severe conditions which can be expected in normal use taking into account the manufacturer's instructions.

2.2.101

forced convection oven

an appliance intended for the cooking of food by heated air which is circulated by mechanical means within the **cooking compartment**. The pressure within the **cooking compartment** does not differ significantly from atmospheric pressure

2.2.102

steam cooker

an appliance intended for the cooking of food only by means of direct steam contact. The pressure within the **cooking compartment** can exceed atmospheric pressure

2.2.103

atmospheric steam cooker

an appliance in which the pressure within the **cooking compartment** does not differ significantly from atmospheric pressure

2.2.104

steam-convection oven

an appliance intended for the cooking of food either by means of direct steam contact or by heated air circulated by mechanical means within the **cooking compartment** or by a combination of these two modes. The pressure within the **cooking compartment** does not differ significantly from atmospheric pressure

2.2.105

rated pressure

the maximum working pressure of **steam cookers** and **steam generators** assigned by the manufacturer to the pressurized parts of the appliance

2.2.106

steam generator

that part of the appliance designed specifically for the generation of steam for exclusive use in a **cooking compartment**

NOTE The **steam generator** may be combined within the **cooking compartment**, remote from the **cooking compartment** but contained within the same casing, or as a separate unit providing steam for one or more **cooking compartments**.

2.2.107

cooking compartment

that part of the appliance in which the cooking or food heating process takes place

2.2.108

indicated level

a mark on the appliance or **steam generator** to indicate the maximum liquid level for correct operation

2.2.109 installation wall

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

3 General requirement

This clause of part 1 is applicable except as follows.

Addition:

NOTE 101 The d.c. component in the appliance neutral is limited (Australia).

4 General conditions for the tests

This clause of part 1 is applicable except as follows.

4.10 *Addition:*

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

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

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

4.102 *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.*

If a part of the appliance or the whole appliance is intended to be used for different functions covered by different standards, the relevant standard is applied to each function separately, so far as is reasonable.

5 Void

6 Classification

This clause of part 1 is applicable except as follows.

6.1 *Replacement:*

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

Compliance is checked by inspection and by the relevant tests.

NOTE **Class 0I appliances** are allowed (Japan).

6.2 Addition:

NOTE 101 For appliances intended to be installed in a kitchen, an appropriate degree of protection against harmful ingress of water is required according to their height of installation (France).

7 Marking and instructions

This clause of part 1 is applicable except as follows.

7.1 Addition:

In addition, appliances shall be marked with

- the water pressure or range of pressures, in kilopascals (kPa), for appliances or **steam generators** intended to be connected to a water supply, unless this is indicated in the instruction sheet;
- the **rated pressure**, in kilopascals (kPa), on pressurized parts of the appliance.

7.6 Addition:

Add the following symbol:



equipotentiality (IEC 60417-5021-a)*

7.12 Addition:

The instruction sheet of **steam cookers** and **steam-convection ovens** shall also include information with regard to the maximum food load in kilograms.

The instruction sheet of **steam cookers** shall include the substance of the following warning:

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

7.12.1 Replacement:

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

For appliances which are permanently connected to fixed wiring and for which leakage currents may exceed 10 mA, particularly if disconnected or not used for long periods, or during initial installation, the instruction sheet shall give recommendations regarding the rating of **protective devices** i.e. earth leakage relays to be installed.

* See IEC 60417-1:1998, *Graphical symbols for use on equipment – Part 1: Overview and application*, and IEC 60417-2:1998, *Graphical symbols for use on equipment – Part 2: Symbol originals*.

If the appliance is constructed so that it is not protected against water jets, clear and detailed instructions for the user shall be delivered together with the appliance. It shall be stated in the instructions that this appliance shall not be cleaned with a water jet.

Compliance is checked by inspection.

7.12.4 Addition:

The instructions for **built-in appliances** having a separate control panel for several appliances shall state that the control panel is only to be connected to the specified appliances in order to avoid a possible hazard.

7.15 Addition:

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

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

7.101 Appliances and **steam generators** intended to be filled by hand or by a manually operated tap shall be marked with an **indicated level**.

Compliance is checked by inspection.

7.102 Equipotential bonding terminals shall be indicated by the equipotentiality symbol (see 7.6).

These indications shall not be placed on screws, removable washers or other parts which 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.

9 Starting of motor-operated appliances

9.1 Fan motors providing a cooling effect in order to comply with the requirements of clause 11 shall start under all voltage conditions which may occur in use.

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

*The motor is started each time under the conditions occurring at the beginning of **normal operation** or, for automatic appliances, at the beginning of the normal cycle of operation, the motor being allowed to come to rest between successive starts. For appliances provided with motors having other than centrifugal starting switches, this test is repeated at a voltage equal to 1,06 times **rated voltage**.*

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

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

NOTE 2 A fan motor for the convection fan only is not considered to provide a cooling effect.

10 Power input and current

This clause of part 1 is applicable except as follows.

10.1 Addition:

NOTE 101 For appliances having more than one heating unit, the total power input may be determined by measuring the power input of each heating unit separately (see also 2.2.4).

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.*
- *Separate **cooking compartments** and **steam generators** are assembled in accordance with the manufacturer's instructions and located in the test corner in such a manner that they will have the most unfavourable effect on each other and on their surroundings.*

11.4 Replacement:

*Appliances are operated under **normal operation** such that the total power input of the appliance is 1,15 times **rated power input**. If it is not possible to switch on all heating elements at the same time, the test is made with each of the combinations that the switch arrangement will allow, the highest load possible with each switching arrangement being in circuit.*

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

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

11.7 Replacement

The appliance is operated as follows:

*Appliances with **steam generators** incorporated in the **cooking compartment** are operated on continuous cycles until steady conditions are established. Each cycle comprises an operating period followed by a rest period strictly sufficient, but in no case longer than 5 min, to allow for replacing the water load, the water level in the **steam generators** intended to be filled by hand being, if necessary, restored to the **indicated level**, in accordance with the manufacturer's instructions.*

The operating period is equal to the maximum cooking time declared by the manufacturer or, if such declaration is not provided, to the time taken for the appliance to reach the maximum temperature conditions.

*Appliances with separate **steam generators** are switched on and allowed to operate until steady conditions are established in the **steam generator**. When these conditions have been reached, the appliance is operated as above.*

Other appliances are operated until steady conditions are established.

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

11.8 Addition:

During the test the pressure relief device shall not operate.

12 Void

13 Leakage current and electric strength at operating temperature

This clause of part 1 is applicable except as follows.

13.2 Modification:

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

- for cord and plug connected appliances 1 mA per kW **rated power input** of the appliance with a maximum of 10 mA
- for other appliances 1 mA per kW **rated power input** of the appliance with no maximum

NOTE 101 Leakage current limits are different (Japan).

14 Void

15 Moisture resistance

This clause of part 1 is applicable except as follows.

15.1.1 Addition:

In addition, IPX0, IPX1, IPX2, IPX3 and IPX4 appliances are subjected for 5 min to the following splash test:

The apparatus shown in figure 101 is used. During the test, the water pressure is so regulated that the water splashes up 150 mm above the bottom of the bowl. The bowl is placed on the floor for appliances normally used on the floor and, for all other appliances on a horizontal support 50 mm below the lowest edge of the appliance; the bowl is so moved around as to splash the appliance from all directions. 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 which are $15\text{ cm} \pm 5\text{ cm}$ in excess of those of the orthogonal projection of the appliance on the support.

15.2 Replacement:

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

Compliance is checked by the following test:

Appliances with **type X attachment**, except those having a specially prepared cord, are fitted with the lightest permissible type of flexible cable or cord of the smallest cross-sectional area specified in 26.2 and other appliances are tested as delivered.

Detachable parts are removed.

A litre of cold water containing approximately 1 % NaCl is poured steadily over a period of 1 min over the bottom surface of the **cooking compartment**.

The water containers of appliances intended to be filled with water by hand are completely filled with water and a further quantity equal to 15 % of the capacity of the container is poured in steadily over a period of 1 min.

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

In addition, **forced convection ovens** with automatic fillers or spraying systems and intended for permanent connection to the water mains, are operated for 5 min with any means which limit the water intake, for example a water level device, flow control, etc., rendered inoperative in the most unfavourable conditions. The fan motor is operated, if it can be operated independently, with the heating elements on or not, whichever is the most severe condition.

During this test the appliance is connected to a water supply (without salt) having the maximum pressure indicated by the manufacturer.

If more than one controlling device is fitted, the test is repeated with each device rendered inoperative in turn.

The appliance shall withstand an electric strength test as specified in 16.3 and inspection shall show that water which may have entered the appliance does not impair compliance with this part: in particular, there shall be no trace of water on insulation for which **creepage distances** and **clearances** are specified in 29.1.

15.3 Addition:

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

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

Compliance is checked by the following test:

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

16 Leakage current and electric strength

This clause of part 1 is applicable except as follows.

16.2 Modification:

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

- for cord and plug connected appliances 2 mA per kW **rated power input** of the appliance with a maximum of 10 mA
- for other appliances 2 mA per kW **rated power input** of the appliance with no maximum

NOTE 101 Leakage current limits are different (Japan).

17 Overload protection of transformers and associated circuits

This clause of part 1 is applicable.

18 Endurance

This clause of part 1 is not applicable.

19 Abnormal operation

This clause of part 1 is applicable except as follows.

19.1 Addition:

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

Appliances provided with a control limiting the pressure during the tests of clause 11 are also subjected to the tests of 19.4.

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

19.2 Modification:

Instead of the first sentence, the following applies:

Dry heat mode:

Appliances are tested under the conditions specified in clause 11, but with the fan motor rendered inoperative.

NOTE If there is more than one fan motor, they are rendered inoperative in turn.

Steaming only and combination modes:

*Appliances are tested under the conditions specified in clause 11, but without water load and with all doors or lids closed. **Steam generators** intended to be filled by hand are operated without water. **Steam generators** intended to be filled by a manually operated tap or automatically are operated with the water supply turned off and the **steam generator** dry.*

19.3 Addition:

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

19.4 Addition:

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

19.7 Modification:

Instead of the text preceding the table, the following applies:

*Moving parts of motor and fan assemblies are locked and the appliance is operated, starting from cold, under **normal operation**, at **rated voltage** or at the upper limit of the **rated voltage range**, as long as is necessary to establish steady conditions or, if a timer is provided, for the maximum period allowed by the timer.*

NOTE 1 If an appliance has more than one motor, the test is made for each motor separately.

NOTE 2 Alternative tests for protected motor units are given in annex D.

Appliances incorporating motors having capacitors in the circuit of an auxiliary winding are operated with the rotor locked, the capacitors being open-circuited one at a time. The test is repeated with the capacitors short-circuited one at a time unless they comply with IEC 60252.

NOTE 3 This test is made with the rotor locked because certain motors with capacitors may or may not start so that variable results could be obtained.

During the test, the temperature of the windings shall not exceed the values shown in table 6.

19.8 Addition:

Compliance is checked as for 19.7.

20 Stability and mechanical hazards

This clause of part 1 is applicable except as follows.

20.1 Addition:

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

Shelf trolleys are subjected to the following additional test:

The trolley, loaded in accordance with the manufacturer's instructions, is placed on a plane which is inclined at 10° to the horizontal. The braking mechanism is applied and the trolley shall not move by more than 100 mm.

NOTE 101 Any spillage of liquid is ignored.

20.2 Add the following after the first requirement paragraph:

This applies also to operating means, i.e. handles or wheels.

Addition:

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

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

Compliance is checked by the test probe of figure 3 of part 1 applied with a force of 10 N.

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 as will cause no damage to the door, and its mass is:

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

Doors, except those where the lower level of the **cooking compartment** is above a normal working surface, 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.

NOTE 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 and deformation of doors and hinges are neglected.

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

- a suitable interlock assembly is fitted which prevents the motor or fan from operating when the guard is removed; or
- the guard forms an integral part of the oven lining.

Compliance is checked by inspection and manual test.

21 Mechanical strength

This clause of part 1 is applicable except as follows.

Addition:

NOTE 101 For appliances intended to be installed in a kitchen, different values of impact energy are applicable according to the height of the impact point (France).

21.101 Shelves shall be constructed so that they do not fall away from the shelf supports either when inside the **cooking compartment** 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 totalling 40 kg for each square metre of tin area. Insert a shelf, with the loaded tin centrally disposed, on the supports provided in the **cooking compartment**. Move the shelf as far as possible to the left, leave for 1 min and then withdraw it. Re-insert the shelf and move it to the extreme right, leave 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 tip.

NOTE A small angle of deflection is allowed.

22 Construction

This clause of part 1 is applicable except as follows.

22.7 Replacement:

Steam cookers and **steam generators** which operate at a pressure in excess of atmospheric pressure (over-pressure) shall incorporate a suitable pressure relief device which prevents excessive pressure.

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

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

22.101 Appliances shall be protected in such a manner that moisture and grease or deposits from the discharge of the **cooking compartment** vent will not collect in such a way as to affect **creepage distance** and **clearance** values.

Compliance is checked by inspection.

22.102 Thermal cut-outs protecting circuits with heating elements and those for motors of which the unexpected starting may cause a hazard shall be of the **non-self-resetting** trip-free type and shall provide **all-pole disconnection** from the supply.

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

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

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

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

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

Compliance is checked by inspection.

22.104 The operating pressure of **steam cookers** and **steam generators** shall not exceed the **rated pressure**.

Compliance is checked during the test of clause 11.

22.105 It shall not be possible to open the **cooking compartment** door of a pressurized appliance until the pressure has been reduced to approximately atmospheric pressure.

Compliance is checked by inspection and by manual test.

22.106 For appliances designed to operate at atmospheric pressure, the steam vents shall be protected either by design, location, or other means against blockage.

Compliance is checked by inspection.

22.107 Means provided to allow drainage of water from **steam generators** and **cooking compartments** shall discharge the water in such a manner that electrical insulation is not affected.

Compliance is checked by inspection and by manual test.

22.108 The level to which manually filled water containers have to be filled shall be so located as to be readily visible when filling.

Compliance is checked by inspection.

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

Compliance is checked by inspection.

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

Compliance is checked by inspection.

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

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

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

22.112 Interlock devices fitted on **cooking compartment** doors and guards in order to comply with the requirements of 20.2 and 20.102 shall be so arranged that

- the fan motor is disconnected from the supply when the **cooking compartment** door is opened to give a gap not greater than 50 mm;
- it shall not be possible to override any interlock using the standard test finger of figure 1 of part 1.

Compliance is checked by inspection and by measurement, and by applying the standard test finger in any position with the cooking compartment door open.

22.113 **Portable appliances** shall be constructed to prevent a hazard resulting from objects penetrating the bottom surface.

Compliance is checked by inspection and by measurement, if necessary.

NOTE Appliances without legs are considered to comply with this requirement if **live parts** are at least 6 mm from the supporting surface measured through any opening. If the appliance is fitted with legs, this distance is increased to 10 mm for appliances intended to be placed on a table and to 20 mm for appliances intended to be placed on the floor.

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

Compliance is checked by inspection.

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

Compliance is checked by inspection and by manual test.

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

22.116 If the dimensions of a **cooking compartment** exceed 700 mm by 1 500 mm by 700 mm, it shall be possible to open the door of the compartment from the inside with a force not exceeding 70 N.

Compliance is checked by inspection and by measurement.

22.117 Appliances provided with a means whereby condensate is automatically discharged shall be constructed so that the discharge does not result in a hazard.

Compliance is checked by inspection.

23 Internal wiring

This clause of part 1 is applicable except as follows.

23.3 Addition:

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

- *Where the capillary tube is fitted as part of the internal wiring, part 1 applies.*
- *Where the capillary tube is separate, it is subjected to 1 000 flexings at a rate not exceeding 30 per min.*

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

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

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

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

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

24 Components

This clause of part 1 is applicable.

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:

Fixed appliances and appliances with a mass greater than 40 kg and not provided with rollers, castors or similar means shall be constructed so that the **supply cord** can be connected after the appliance has been installed in accordance with the manufacturer's instructions.

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

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

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

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

Compliance is checked by inspection.

25.7 Modification:

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

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

26 Terminals for external conductors

This clause of part 1 is applicable.

27 Provision for earthing

This clause of part 1 is applicable except as follows.

27.2 Addition:

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

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

28 Screws and connections

This clause of part 1 is applicable.

29 Creepage distance, clearances and distances through insulation

This clause of part 1 is applicable.

30 Resistance to heat, fire and tracking

This clause of part 1 is applicable except as follows.

30.2.1 Modification:

The glow-wire test of annex K is made at a temperature of 650 °C.

30.2.2 Not applicable

30.3 Addition:

NOTE 101 Switching devices with moving contacts, other than those manually operated and those intended to operate only during abnormal operation, are considered as subjected to extra-severe duty conditions.

In addition, other parts of insulating materials are also considered as subjected to extra-severe duty conditions, unless they are so enclosed or located that pollution by condensation is unlikely to occur; in such a case, the requirements for severe duty conditions apply.

30.101 Filters, if any, of non-metallic materials intended for the absorption of grease are subjected to the burning test specified in annex J, except that the thickness of the specimen is the same as that in the appliance.

NOTE 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.