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IS 302-2-15 (2009): Safety of household and similar electrical appliances, Part 2: Particular requirements: Section 15 Appliances for heating liquids [ETD 32: Electrical Appliances]



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भारतीय मानक
घरेलू और समान विद्युत साधित्रों की सुरक्षा
भाग 2 विशेष अपेक्षाएँ
अनुभाग 15 तापन द्रवों के साधित्र
(पहला पुनरीक्षण)

Indian Standard
SAFETY OF HOUSEHOLD AND SIMILAR
ELECTRICAL APPLIANCES
PART 2 PARTICULAR REQUIREMENTS
Section 15 Appliances for Heating Liquids
(*First Revision*)

ICS 97.040.50; 13.120

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FOREWORD

This Indian Standard (Part 2/Sec 15) (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Electrical Appliances Sectional Committee had been approved by the Electrotechnical Division Council.

This standard was first published in 1993. The first revision has been undertaken primarily to align the existing standard with latest International Standard.

This standard covers the safety requirements of appliances for heating liquids. This standard, however, does not cover the performance requirements.

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

This standard recognizes the International 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.

If the functions of an appliance are covered by different parts and sections of IS 302, the relevant Part and Section 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.

NOTE — Throughout this publication, wherever Part 2 is mentioned, it refers to the relevant Part of IS 302.

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.

Application of this standard, as far as is reasonable, may be considered to appliances not mentioned in Part 2, and to appliances designed on new principles.

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, which 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.

This standard is to be read in conjunction with IS 302-1 (2008) 'Safety of household and similar electrical appliances: Part 1 General requirements'. For the sake of convenience, the clauses of this standard correspond to those of IS 302-1 (2008), instead of reproducing full text of each clause, clauses of IS 302-1 (2008) which are applicable (which means that relevant provisions of the clause apply) or not applicable and the subclauses or portion thereof which are not applicable are indicated as under:

- a) In case of a clause where it is applicable, the wording used is 'This clause of IS 302-1 (2008) is applicable/not applicable'; and
- b) In case of a subclause or part thereof 'Not applicable'.

Wherever a subclause of IS 302-1 (2008) is to be replaced by a new text, it has been indicated as under:

Replacement – followed by the new text.

Any addition to the existing provision of a subclause of IS 302-1 (2008) has been indicated as under:

Addition – followed by the text of the additional matter.

Clauses/tables which are additional to those of IS 302-1 (2008) are numbered starting from 101 and additional

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subclauses are numbered with the main clause number followed by 101, 102, etc, for example, **7.101**.

Should, however, any deviation exist between IS 302-1 (2008) and this standard, the provisions of the latter shall apply.

This standard is based on IEC 60335-2-15 (2005) 'Safety of household and similar electrical appliances — Part 2-15 : Particular requirements for appliances for heating liquids' issued by the International Electrotechnical Commission except for the following modification:

- a) The leakage current value is more stringent as compared to IEC Publication, and
- b) Ambient test conditions are based on national conditions.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

**SAFETY OF HOUSEHOLD AND SIMILAR
ELECTRICAL APPLIANCES**

PART 2 PARTICULAR REQUIREMENTS

Section 15 Appliances for Heating Liquids

(First Revision)

1 SCOPE

This clause of Part 1 is replaced by the following:

This standard deals with the safety of electrical appliances for heating liquids for household and similar purposes, their rated voltage being not more than 250 V.

NOTE 101 — Some appliances may be used for heating food.

NOTE 102 — Examples of appliances that are within the scope of this standard are:

- a) coffee-makers;
- b) cooking pans;
- c) egg boilers;
- d) feeding-bottle heaters;
- e) kettles and other appliances for boiling water, having a rated capacity not exceeding 10 l;
- f) milk heaters;
- g) pressure cookers having a rated cooking pressure not exceeding 140 kPa and a rated capacity not exceeding 10 l;
- h) slow cookers;
- j) steam cookers;
- k) wash boilers; and
- m) yoghurt makers.

Appliances not intended for normal household use but which nevertheless may be a source of danger to the public, such as appliances intended to be used by laymen in shops, in light industry and on farms, are within the scope of this standard.

NOTE 103 — Examples of such appliances are:

- a) glue pots with a water jacket,
- b) livestock feed boilers, and
- c) sterilizers.

As far as is practicable, this standard deals with the common hazards presented by appliances that are encountered by all persons in and around the home. However, in general, it does not take into account:

- a) the use of appliances by young children or infirm persons without supervision, and
- b) playing with the appliance by young children.

NOTE 104 — 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.

NOTE 105 — This standard does not apply to:

- a) frying pans and deep fat fryers (IS 302-2-13);
- b) storage water heaters (IS 302-2-21);
- c) instantaneous water heaters (IS 302-2-35);
- d) surface-cleaning appliances employing liquids or steam ;
- e) portable immersion heaters (IS 302-2-201);
- f) commercial dispensing appliances and vending machines;
- g) appliances for medical purposes;
- h) appliances intended exclusively for industrial purposes;
- j) 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);
- k) appliances for high-frequency heating;
- m) pressure sterilizers; and
- n) humidifiers for household and similar use.

NOTE 106 — Attention is drawn to the fact that in many countries requirements for pressure vessels are applied to pressure cookers.

2 REFERENCES

This clause of Part 1 is applicable.

3 TERMINOLOGY

This clause of Part 1 is applicable except as follows:

3.1.9 Replacement

Normal Operation — Operation of the appliance under the following conditions:

3.1.9.101 Kettles, thermal pots, urns and other appliances for boiling water, coffee-makers, cooking pans, glue pots, milk heaters, slow cookers, sterilizers, wash boilers and yoghurt makers are operated with their container filled with the rated capacity of water, any lid being closed. The quantity of water in slow cookers is maintained above 50 percent of their rated capacity.

Appliances with a heated surface intended to keep the liquid warm are operated with or without the container, whichever is the more unfavourable.

3.1.9.102 Egg boilers and steam cookers are operated with their containers filled with the maximum quantity of water specified in the instructions.

3.1.9.103 Feeding-bottle heaters are operated with a bottle of heat-resistant glass, round or hexagonal in shape, having a mass between 190 g and 200 g and a capacity of approximately 225 ml, unless a particular bottle is specified, in which case that bottle is used. The bottle is filled to approximately its rated capacity of water or 200 ml, whichever is less, and is placed in the feeding-bottle heater. The heater is filled with water to the level specified in the instructions or, in the absence of instructions, to the maximum level.

3.1.9.104 Livestock feed boilers are operated with the lid closed, the container being filled with half its rated capacity of water.

3.1.9.105 Pressure cookers are operated in accordance with the instructions but with the container filled with water to a depth of 25 mm.

3.101 Rated Capacity — Capacity assigned to the appliance by the manufacturer.

3.102 Rated Cooking Pressure — Pressure assigned to the appliance by the manufacturer.

3.103 Espresso Coffee-Maker — Coffee-maker in which water is heated and forced through the ground coffee by steam pressure or by means of a pump.

NOTE — Espresso coffee-makers may have an outlet for supplying steam or hot water.

3.104 Feeding-Bottle Heater — Appliance for heating prepared baby food in a feeding-bottle to a predetermined temperature, heat being transferred by means of water.

3.105 Pressure Regulator — Control that maintains the pressure at a particular value during normal use.

3.106 Pressure-Relief Device — Control that limits the pressure under abnormal operating conditions.

3.107 Cordless Kettle — Kettle incorporating a heating element and which is connected to the supply only when placed on its associated stand.

3.108 Steam Cooker — Appliance in which food is heated by steam generated at atmospheric pressure.

4 GENERAL REQUIREMENTS

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

NOTE 101 — If the test of 15.101 has to be carried out, three additional samples are required.

5.3 Addition

The test of 19.101 is carried out after the other tests.

6 CLASSIFICATION

This clause of Part 1 is applicable except as follows:

6.2 Addition

Wash boilers and livestock feed boilers shall be at least IPX3.

7 MARKING AND INSTRUCTIONS

This clause of Part 1 is applicable except as follows:

7.1 Addition

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

‘Do not immerse beyond this level’.

Kettles shall have a level mark or other means to indicate when they are filled to rated capacity, unless they cannot be filled beyond their rated capacity. This indication shall be visible when the kettle is in the filling position. If the level mark is not self-evident, there shall be a reference to this mark on the outside of the kettle which shall be visible when the kettle is in its normal position of use.

If the closed position of the lid of a pressure cooker is not obvious, this position shall be marked on the appliance.

Stands provided with cordless kettles shall be marked with:

- a) the name, trade-mark or identification mark of the manufacturer or responsible vendor; and
- b) the model or type reference.

7.12 Addition

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

The instructions for appliances intended to be used with a connector incorporating a thermostat shall state that only the appropriate connector shall be used.

Unless kettles are constructed so that a hazard cannot arise from boiling water being ejected, the instructions shall state that if the kettle is overfilled, boiling water may be ejected.

The instructions for kettles filled through a lid aperture

situated below the handle shall include the substance of the following:

WARNING — Position the lid so that steam is directed away from the handle.

NOTE 101 — The warning is not required if the lid can only be closed so that steam is directed away from the handle.

WARNING — Do not remove the lid while water is boiling.

The instructions for cordless kettles shall state that the kettle is only to be used with the stand provided.

If the kettle and stand of cordless kettles can be lifted together by gripping the handle of the kettle, the instructions shall include the substance of the following:

CAUTION — Insure that the kettle is switched off before removing it from its stand.

The instructions for feeding-bottle heaters shall state:

- a) that the food should not be heated for too long, and
- b) how to check that the correct food temperature has not been exceeded.

The instructions for appliances normally cleaned after use, and not intended to be immersed in water for cleaning, shall state that the appliance shall not be immersed.

NOTE 102 — This requirement normally applies to coffee-makers, cooking pans, milk heaters, pressure cookers, steam cookers, slow cookers and yoghurt makers.

The instructions for pressure cookers shall state that the ducts in the pressure regulator allowing the escape of steam should be checked regularly to ensure that they are not blocked. They shall also give details of how to open the container safely and state that the container shall not be opened until the pressure has decreased sufficiently.

The instructions for egg boilers provided with a pricking device shall contain the substance of the following:

CAUTION — Avoid injuries from the egg pricker.

For espresso coffee-makers incorporating a pressurized reservoir filled by the user, the instructions shall contain information for the safe refilling of the water reservoir and the substance of the following:

WARNING — The filling aperture shall not be opened during use.

7.101 BIS Certification Marking

The appliances may also be marked with the Standard Mark.

The use of the Standard Mark is governed by the

provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

8 PROTECTION AGAINST ACCESS TO LIVE PARTS

This clause of Part 1 is applicable except as follows:

8.1.2 Addition

NOTE 101 — Connecting devices in stands of cordless kettles are not considered to be socket-outlets.

9 STARTING OF MOTOR-OPERATED APPLIANCES

This clause of Part 1 is not applicable.

10 POWER INPUT AND CURRENT

This clause of Part 1 is applicable.

11 HEATING

This clause of Part 1 is applicable except as follows:

11.2 Addition

Portable appliances are tested away from the walls of the test corner.

11.4 Addition

If the temperature rise limits are exceeded in appliances incorporating motors, transformers or electronic circuits, and if the power input is lower than the rated power input, the test is repeated with the appliance supplied at 1.06 times the rated voltage.

11.6 Addition

Combined appliances are operated as heating appliances.

11.7 Replacement

Appliances are operated for the duration specified in **11.7.101** to **11.7.105**.

11.7.101 For kettles incorporating a temperature limiter, the temperature limiter is reset 1 min after it has operated or as soon as possible afterwards. The test is terminated after the temperature limiter has operated for the second time.

For kettles incorporating a thermostat, the test is terminated 15 min after the water has attained a temperature of 95°C.

For other kettles the test is terminated 5 min after the water has attained a temperature of 95°C.

11.7.102 For cooking pans, egg boilers, feeding-bottle heaters, glue pots, livestock feed boilers, milk heaters, sterilizers, wash boilers and for appliances that boil water other than kettles, the test is terminated:

- a) for appliances without a thermal control, 15 min after the water in the container has attained a temperature of 95°C or the maximum temperature it can attain if this is lower;
- b) for portable appliances provided with a thermal control, 15 min after the thermal control has operated for the first time;
- c) for fixed appliances provided with a thermal control, 30 min after the thermal control has operated for the first time;
- d) 1 min after a continuous or repetitive acoustic signal having intervals of less than 5 s has sounded; and
- e) when steady conditions are established, for egg boilers having provision for keeping eggs warm, and appliances having a heated surface intended to keep liquid warm.

11.7.103 Slow cookers, steam cookers and yoghurt makers are operated until steady conditions are established. Slow cookers are prewarmed in the dry state if this instruction is given.

11.7.104 Espresso coffee-makers are operated in accordance with the instructions, the coffee filter being filled with the maximum quantity of coffee of the type specified. The brewing period is followed by a rest period of 1 min or the period stated in the instructions, if this is longer. The water container is refilled during the rest periods.

For espresso coffee-makers having an outlet for supplying steam or hot water, the brewing period is immediately followed by a period during which the steam or water is supplied for the time stated in the instructions.

NOTE — The steam is blown into a vessel containing cold water.

Espresso coffee-makers are operated until steady conditions are established.

Other coffee-makers are operated for the time necessary to make the maximum quantity of coffee stated in the instructions. The container is then refilled as quickly as possible and the coffee-maker operated again.

The procedure is repeated until steady conditions are established.

11.7.105 Pressure cookers are operated for 15 min after attaining the maximum cooking pressure.

11.8 Addition

When an appliance connector incorporates a thermostat, the temperature rise limit for the pins of the inlet does not apply.

The temperature rise limits of motors, transformers and components of electronic circuits, including parts directly influenced by them, may be exceeded when the appliance is operated at 1.15 times rated power input.

12 VOID

13 LEAKAGE CURRENT AND ELECTRIC STRENGTH AT OPERATING TEMPERATURE

This clause of Part 1 is applicable.

14 TRANSIENT OVERVOLTAGES

This clause of Part 1 is applicable.

15 MOISTURE RESISTANCE

This clause of Part 1 is applicable except as follows:

15.2 Addition

The test is only carried out with the appliance connector in position.

In case of doubt, the spillage test is carried out with the appliance deviating from the normal position of use by an angle not exceeding 5°.

Kettles that can be filled through the spout are also tested on a plane inclined at an angle of 20° to the horizontal, with the spout uppermost. The kettle is filled with water containing approximately 1 percent sodium chloride (NaCl) to the maximum level, if this indication is visible from the filling position, otherwise until water spills from the kettle. A further quantity, equal to 15 percent of the rated capacity of the kettle, is then added as quickly as possible.

For cordless kettles, the test with the kettle on the horizontal plane is carried out with the kettle both on and off its stand. The additional test for kettles that can be filled through the spout is carried out only with the cordless kettle off its stand, the kettle being replaced on its stand in order to carry out the electric strength test of **16.3**.

Modification

For steam sterilizers, replace the penultimate paragraph of this subclause of Part 1 by the following:

Steam sterilizers are placed on a horizontal surface and 30 ml of water containing approximately 1 percent NaCl is poured onto the top rim in the most unfavourable place. The solution is poured steadily

through a tube having an inner diameter of 8 mm over a period of 2 s, the lower end of the tube being 200 mm above the appliance.

NOTE 101 — A schematic representation of the test arrangement is shown in Fig.101.

Add the following after the last paragraph of the addition:

Kettles are then filled to rated capacity with water. They are placed on a plane inclined at an angle of 20° to the horizontal with their spout facing up the slope of the inclined plane. Water shall not be discharged from the kettle.

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

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

The appliances are operated under normal operation at 1.15 times rated power input, until the thermostat operates for the first time. Appliances without a thermostat are operated until steady conditions are established. The appliances are disconnected from the supply, any appliance connector being withdrawn. They are then completely immersed in water containing

approximately 1 percent NaCl and having a temperature between 10°C and 25°C, unless they are marked with the maximum level of immersion, in which case they are immersed 50 mm deeper than this level.

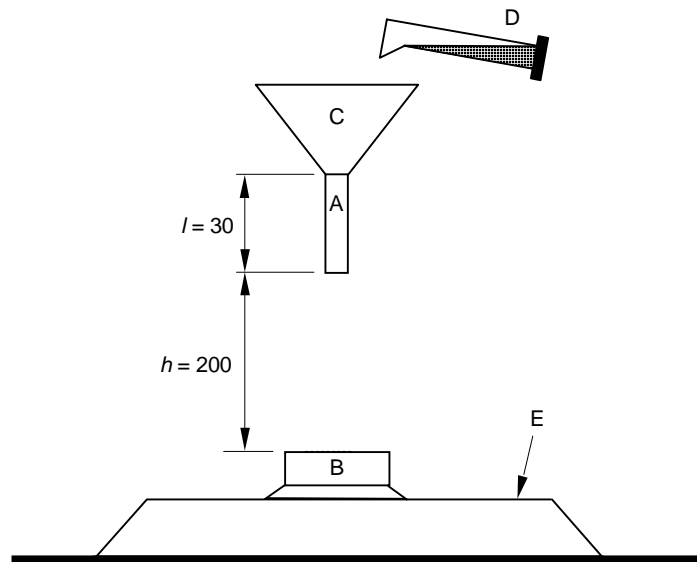
After 1 h, the appliances are removed from the saline solution, dried and subjected to the leakage current test of 16.2.

NOTE — Care is taken to ensure that all moisture is removed from the insulation around the pins of appliance inlets.

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

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

The remaining two appliances are operated under normal operation at 1.15 times rated power input for 240 h. After this period, the appliances are disconnected from the supply and immersed again for 1 h. They are then dried and subjected to the electric strength test of 16.3, the voltage being as specified in Table 4.



Key

A = funnel tube with inner diameter of 8 mm

B = item under test

C = funnel

D = container with 30 ml of saline solution

E = horizontal surface

All dimensions in millimetres.

FIG. 101 SCHEMATIC REPRESENTATION OF THE TEST ARRANGEMENT

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

15.102 The connecting devices of stands for cordless kettles shall not be affected by water.

Compliance is checked by the following test.

The stand is placed on a horizontal surface and 30 ml of water containing approximately 1 percent NaCl is poured onto the connecting device. The solution is poured steadily through a tube having an inner diameter of 8 mm over a period of 2 s, the lower end of the tube being 200 mm above the connecting device.

NOTE — A schematic representation of the test arrangement is shown in Fig. 101.

The stand shall then withstand the electric strength test of 16.3, the test voltage for reinforced insulation being 2 500 V.

16 LEAKAGE CURRENT AND ELECTRIC STRENGTH

This clause of Part 1 is applicable.

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

Kettles are not subjected to the test of 19.2.

Kettles are also subjected to the test of 19.101, unless the appliance incorporates a non-self-resetting thermal cut-out that is not resettable by the user, in order to comply with 19.4.

Kettles for which compliance with 19.101 relies on the operation of a self-resetting thermal cut-out are also subjected to the test of 19.102.

19.2 Addition

Appliances are placed as near as possible to the walls of the test corner. They are tested empty with lids open or closed whichever is more unfavourable.

19.3 Addition

Kettles are operated empty at 1.15 times rated power input.

The test is also carried out with the kettle filled with sufficient water to cover the heating element, or to a depth of 10 mm if the heating element is not positioned inside the container, the lid being open or closed, whichever is more unfavourable.

19.4 Addition

Pressure regulators of pressure cookers are rendered inoperative together with each protective device in turn.

19.7 Addition

Espresso coffee-makers incorporating a pump are operated for a period of 5 min.

19.13 Addition

During the test of 19.4, pressure-relief devices of pressure cookers shall operate before the pressure has reached 350 kPa.

19.101 Kettles are placed on a plywood board having a thickness of approximately 20 mm. The thermal cut-out that operates during the test of 19.4 is short circuited and the kettle is operated empty at 0.85 times rated power input or 1.15 times rated power input, whichever is more unfavourable.

During the test, any flames shall be kept within the enclosure of the kettle and the supporting surface shall not ignite.

After the test, live parts shall not be accessible.

NOTES

1 If the kettle incorporates more than one thermal cut-out that could operate during the test of 19.4, they are short circuited in turn.

2 Subclause 19.13 is not applicable.

19.102 Kettles incorporating two self-resetting thermal cut-outs are operated with one of the thermal cut-outs short circuited. The kettle is operated empty at 0.85 times rated power input or 1.15 times rated power input, whichever is more unfavourable.

Within 2 s of the other thermal cut-out operating, the kettle is filled with water having a temperature of $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$. After 1 min, the kettle is emptied.

The test is carried out 100 times.

NOTE — Clause 19.13 is applicable.

19.103 For appliances with detachable liquid containers, the automatic transfer of liquid from one container to another shall not give rise to an electrical hazard if they are incorrectly positioned.

Compliance is checked by assembling the appliance with its receiving container incorrectly positioned or removed. The water discharge pipe is incorrectly

positioned if this is more unfavourable. The appliance is operated as specified in **11** but for one cycle only.

The appliance shall then withstand the electric strength test of **16.3** and inspection shall show that there is no trace of water on insulation that could result in the reduction of clearances and creepage distances below the values specified in **29**.

20 STABILITY AND MECHANICAL HAZARDS

This clause of Part 1 is applicable.

21 MECHANICAL STRENGTH

This clause of Part 1 is applicable except as follows:

21.1 Addition

NOTE **101** — Breakage of glass parts is neglected provided that compliance with **8.1**, **15.1** and **15.101** is not impaired.

22 CONSTRUCTION

This clause of Part 1 is applicable except as follows:

22.6 Addition

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

Compliance is also checked by measurement.

22.7 Addition

Espresso coffee-makers are filled with water to their rated capacity and operated at rated power input with the coffee filter blocked and any valve for the supply of steam closed. The maximum pressure attained is measured. The appliance is then subjected to twice the measured pressure for 5 min.

NOTES

101 The overpressure may be supplied from an external source, care being taken to ensure that the espresso coffee-maker is at the normal temperature for brewing.

102 If the valve for steam supply is linked to the switch used for starting the production of steam, this link is not to be disturbed while measuring the maximum pressure.

103 Adequate safeguards have to be taken to avoid risks due to explosion.

The appliance shall not rupture, there shall be no leakage other than through a self-resetting pressure-relief device and the appliance shall be suitable for further use.

Controls that limit the pressure are rendered inoperative and the appliance is operated again as described for determining the maximum pressure.

The appliance shall not explode or emit hazardous jets of steam. If an intentionally weak part ruptures, the test is repeated on a second appliance and shall be terminated in the same mode.

All pressure regulators and pressure-relief devices of pressure cookers are rendered inoperative and the lid is closed. The pressure is gradually increased hydraulically to six times the rated cooking pressure. The container shall not rupture.

22.101 Kettles shall be constructed so that the lid does not fall off when water is poured out.

Compliance is checked by the following test.

The kettle is filled to its rated capacity and the lid closed in accordance with the instructions. The kettle is supplied at rated voltage and operated until the water boils. Approximately 90 percent of the water is poured from the kettle in the normal way. The lid shall not fall off and water shall only be emitted from the spout.

22.102 Kettles shall be constructed so that there are no sudden jets of steam or hot water likely to expose the user to a hazard when the appliance is used as in normal use.

NOTE — Normal use takes into account the instructions concerning the position of the lid and the likely position of the user's hands when gripping the handle.

Compliance is checked by inspection during the test of **11**.

22.103 The appliance coupler of cordless kettles shall be constructed to withstand the stresses occurring during normal use.

Compliance is checked by the following test.

The two live pins of the kettle are connected together and an external resistive load is connected in series with the supply. The external load is such that the current is 1.1 times rated current.

The kettle is placed on its stand and withdrawn 10 000 times at a rate of approximately 10 times per minute. The test is continued for a further 10 000 times without current flowing.

After the test, the kettle shall be suitable for further use and compliance with **8.1**, **16.3**, **27.5** and **29** shall not be impaired.

The test is carried out without current flowing if the connection contacts cannot make or break on load.

22.104 Portable appliances for boiling water that have a rated capacity exceeding 3 l and which are liable to overturn, shall be constructed so that the rate of discharge is limited.

Compliance is checked by the following test, appliances incorporating an appliance inlet being fitted with a cord set.

The appliance is filled with water to its rated capacity and the lid closed in accordance with the instructions.

IS 302-2-15 : 2009

It is placed on a horizontal plane in any position of normal use but orientated to produce the most unfavourable result.

The plane is slowly inclined to an angle of 25°. If the appliance overturns, it is left in this position for 10 s and then returned to its normal position. The quantity of water remaining is measured. The rate of discharge of water is determined from the formula:

$$D = \frac{60(C_1 - C_2)}{t}$$

where

- D = rate of discharge of water;
- C_1 = rated capacity in litres;
- C_2 = remaining quantity of water in litres; and
- t = duration of the discharge in seconds, measured from the time the appliance overturns.

The rate of discharge of water shall not exceed 16 l/min.

NOTE — Suitable means may be used to prevent the appliance from slipping on the inclined plane.

22.105 Fixed appliances for boiling water shall be constructed so that the container is always open to the atmosphere through an aperture of at least 5 mm in diameter, or 20 mm² in area with a width of at least 3 mm. The aperture shall be located so that it is unlikely to be obstructed in normal use.

If the appliance has provision for discharging steam or for water overflow, the discharge aperture shall be at the base of the appliance and shall discharge vertically downwards.

Compliance is checked by inspection and by measurement.

22.106 Espresso coffee-makers shall be constructed so that it is not possible to remove the coffee filter by a simple operation while there is a hazardous pressure within the container.

NOTE — This requirement is considered to be met if the coffee filter can only be removed after it has been rotated through an angle of at least 30°.

Compliance is checked by inspection and by manual test.

22.107 Pressure cookers shall incorporate a non-self-resetting pressure or temperature responsive pressure-relief device.

Compliance is checked by inspection.

22.108 Pressure cookers shall be constructed so that the lid cannot be removed while the pressure within the container is excessive. They shall incorporate a

means to release the pressure to a value such that the lid can be removed without risk.

Compliance is checked by the following test.

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

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

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

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

22.109 Feeding-bottle heaters shall emit a visible or audible signal to indicate that the heating period is terminated.

Compliance is checked by inspection during the test of **11**.

22.110 Espresso coffee-makers, incorporating a pressurized reservoir filled by the user, shall be constructed so that there is no spillage of water or sudden jets of steam or hot water likely to expose the user to a hazard when the appliance is used in accordance with the instructions.

When removing the filling cap of the pressurized reservoir, before the cap is removed completely, the pressure shall be relieved in a controlled manner in order to avoid the emission of jets of steam or hot water that are likely to expose the user to a hazard.

Compliance is checked by inspection during the test of **11** and by removing the filling cap at the end of the test.

23 INTERNAL WIRING

This clause of Part 1 is applicable.

24 COMPONENTS

This clause of Part 1 is applicable except as follows:

24.1.3 Addition

Switches incorporated in espresso coffee-makers for initiating brewing or steaming are subjected to 10 000 cycles of operation.

24.1.4 Addition

Self-resetting thermal cut-outs required for compliance

with the test of **19.101** are subjected to 3 000 cycles of operation.

24.1.5 Addition

For appliance couplers incorporating thermostats, thermal cut-outs or fuses in the connectors, IS/IEC 60320-1 (2001) is applicable except that:

- a) the earthing contact of the connector is allowed to be accessible, provided that this contact is not likely to be gripped during insertion or withdrawal of the connector;
- b) the temperature required for the test of **18** is that measured on the pins of the appliance inlet during the test of **11** of this standard;
- c) the breaking-capacity test of **19** is carried out using the inlet of the appliance; and
- d) the temperature rise of current-carrying parts specified in **21** is not determined.

NOTE **101** — Thermal controls are not allowed in connectors complying with the standard sheets of IS/IEC 60320-1 (2001).

24.4 Addition

NOTE **101** — This requirement is not applicable to the connection between the kettle and the stand of cordless kettles.

24.101 Devices incorporated in appliances, other than kettles, for compliance with **19.4**, shall be non-self resetting. However, self-resetting thermal cut-outs are allowed for fixed water boilers if they have been subjected to 10 000 cycles of operation.

Compliance is checked by inspection and during the test of **19.4**.

25 SUPPLY CONNECTION AND EXTERNAL FLEXIBLE CORDS

This clause of Part 1 is applicable except as follows:

25.1 Addition

Appliances incorporating an appliance inlet, other than those standardized in IS/IEC 60320-1 (2001) shall be supplied with a cord set.

25.5 Addition

Type Z attachment is allowed for egg boilers, feeding-bottle heaters, steam sterilizers, yoghurt makers and stands of cordless kettles.

25.7 Addition

The supply cord of livestock feed boilers shall be polychloroprene sheathed.

25.8 Addition

Portable appliances having a rated current up to 10 A may incorporate a supply cord having a nominal cross-

sectional area of 0.75 mm², if the length is less than 2 m.

25.101 Supply cords of kettles shall not be longer than 75 cm, unless they are helically coiled.

Compliance is checked by measurement.

If a cordless kettle has a cord storage facility, the length of the cord is measured after storing as much of the cord as possible.

NOTE — The length of the cord is measured between the plug and the point where the cord or cord guard enters the appliance.

26 TERMINALS FOR EXTERNAL CONDUCTORS

This clause of Part 1 is applicable.

27 PROVISION FOR EARTHING

This clause of Part 1 is applicable.

28 SCREWS AND CONNECTIONS

This clause of Part 1 is applicable.

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 if the insulation can be polluted by condensation from steam produced during normal use of the appliance.

30 RESISTANCE TO HEAT AND FIRE

This clause of Part 1 is applicable except as follows:

30.1 Addition

For coffee-makers, egg boilers, kettles and steam cookers, the temperature rises occurring during the tests of **19.4**, **19.5** and **19.101** are not taken into account.

30.2 Addition

For water distillers and appliances intended to maintain liquid or food at a particular temperature, **30.2.3** is applicable. For other appliances, **30.2.2** is applicable.

31 RESISTANCE TO RUSTING

This clause of Part 1 is applicable.

32 RADIATION, TOXICITY AND SIMILAR HAZARDS

This clause of Part 1 is applicable.

101 TESTS

101.1 Type Tests

The tests specified in Table 101 shall constitute the

type tests and shall be carried out on a sample selected preferably at random from regular production lot (*see 5.3*). Before commencement of the tests, the irons shall be visually examined and inspected of components, parts and their assembly, constructions, mechanical hazards, marking provision of suitable terminals for supply connections, earthing and the effectiveness screws and connection. The external surface finish shall be even and free from finishing defects.

Table 101 Schedule of Type Tests
(Clause 101.1)

Sl No. (1)	Tests (2)	Clause Reference (3)
i)	Protection against access to live parts	8
ii)	Power input and current	10
iii)	Heating	11
iv)	Leakage current and electric strength at operating temperature	13
v)	Transient overvoltages	14
vi)	Moisture resistance	15
vii)	Leakage current and electric strength	16
viii)	Overload protection of transformers and associated circuits	17
ix)	Abnormal operation	19
x)	Stability and mechanical hazards	20
xi)	Mechanical strength	21
xii)	Construction	22
xiii)	Internal wiring	23
xiv)	Components	24
xv)	Supply connection and external flexible cords	25
xvi)	Terminals for external conductors	26
xvii)	Provision for earthing	27
xviii)	Screws and connections	28
xix)	Clearances, creepage distances and solid insulation	29
xx)	Resistance to heat and fire	30
xxi)	Resistance to rusting	31
xxii)	Radiation, toxicity and similar hazards	32

101.1.1 Criteria of Acceptance

Sample shall successfully pass all the type tests for proving conformity with the requirements of the standard. If the sample fails in any of the type tests, the testing authority, at its discretion, may call for fresh samples not exceeding twice the original number and subject them again to all tests or to the test(s) in which failure(s) had occurred. No failure should be permitted in the repeat test(s).

101.2 Acceptance Tests

The following shall constitute the acceptance tests:

Test (1)	Clause Reference (2)
a) Protection against access to live parts	8
b) Power input and current	10
c) Heating	11
d) Leakage current and electric strength at operating temperature	13
e) Moisture resistance	15
f) Leakage current and electric strength	16
g) Provision for earthing	27

NOTE — For the purpose of acceptance tests, the humidity treatment shall be done for 24 h while conducting the test for moisture resistance (15).

101.2.1 A recommended sampling procedure for acceptance tests is given in Annex J of IS 302-1.

101.3 Routine Tests

Test (1)	Clause Reference (2)
a) Protection against access to live parts	8
b) High voltage	13.3.2 of IS 302-1
c) Provision for earthing	27

ANNEXES

The Annexes of Part 1 are applicable except as follows.

ANNEX C (Foreword)

AGEING TEST ON MOTORS

Modification

The value of p in Table C-1 is 2 000.

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This Indian Standard has been developed from Doc No.: ETD 32 (5770).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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