

इंटरनेट

मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 302-2-9 (2009): Safety of household and similar electrical appliances, Part 2: Particular requirements: Section 9 Toasters, Grills, Roasters and similar appliances [ETD 32: Electrical Appliances]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

BLANK PAGE



भारतीय मानक
घरेलू और समान विद्युत साधित्रों की सुरक्षा
भाग 2 विशेष अपेक्षाएँ
अनुभाग 9 टोस्टर, ग्रिल, रोस्टर और समान साधित्र
(पहला पुनरीक्षण)

Indian Standard
SAFETY OF HOUSEHOLD AND SIMILAR
ELECTRICAL APPLIANCES
PART 2 PARTICULAR REQUIREMENTS
Section 9 Toasters, Grills, Roasters and Similar Appliances
(*First Revision*)

ICS 97.040.50; 13.120

© BIS 2009

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

FOREWORD

This Indian Standard (Part 2/Sec 9) (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. This revision has been undertaken primarily to align the existing standard with corresponding latest International Standard and also to align with the revised version of Part 1 of this standard.

This standard covers the safety requirements of toasters, grills, roasters and similar portable cooking appliances for household and similar use.

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 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 IS 732 : 1989 'Code of practice for electrical wiring installations' and SP 30 : 1985 'National Electrical Code' 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 IS 302, 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.

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.

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 or Modification – 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.

(Continued on third cover)

(Continued from second cover)

Clauses/tables which are additional to those of IS 302-1 (2008) are numbered starting from 101 and additional 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 60335-2-9 (2008) 'Safety of household and similar electrical appliances — Part 2-9: Particular requirements for toasters, grills, roasters and similar appliances' issued by the International Electrotechnical Commission except for the following modification:

- a) The leakage current value is more stringent as compared to IEC Publication,
- b) Ambient test conditions are based on national conditions,
- c) Schedule of type and acceptance test added, and
- d) Requirements of pop-corn makers not included.

Following changes have been incorporated in this revision:

- a) Breadmakers have been included in the scope;
- b) Procedure of normal operation of radiant grills and rotary grills modified (*see 3.1.9.106*);
- c) Procedure of normal operation of breadmakers added (*see 3.1.9.111*);
- d) Definitions of rotary, radiant grills and bread makers added;
- e) IPX4 appliances included;
- f) Symbols for hot surface added in marking clause;
- g) Additional requirements incorporated in marking clause (*see 7.12, 7.14 and 7.15*);
- h) Test requirements of breadmakers, rotary and radiant grills added;
- j) Transient overvoltage (*see 14*) test added;
- k) Value of impact energy for outdoor appliances included;
- m) Additional requirements added for construction requirements (*see 22.111 and 22.112*);
- n) Material of sheath of supply cord for outdoor appliances specified (*see 25.7*);
- p) Additional test for resistance to heat and fire included (*see 30.1 and 30.2*);
- q) Additional requirements added in **31** for resistance to rusting; and
- r) Illustration of breadmakers added (Fig. 101).

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 9 Toasters, Grills, Roasters and Similar Appliances

(*First Revision*)

1 SCOPE

This clause of Part 1 is replaced by the following.

This standard deals with the safety of electric portable appliances for household purposes that have a cooking function such as baking, roasting and grilling, their rated voltage being not more than 250 V.

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

- a) barbecues for indoor use,
- b) breadmakers,
- c) contact grills (griddles),
- d) cookers,
- e) food dehydrators,
- f) hotplates,
- g) portable ovens,
- h) raclette grills,
- j) radiant grills,
- k) roasters,
- m) rotary grills,
- n) rotisseries,
- p) toasters, and
- q) waffle irons.

Examples are illustrated in Fig. 101.

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 102 — Attention is drawn to the fact that:

- a) for appliances intended to be used in vehicles or on board ships or aircraft, additional requirements may be necessary; and
- b) additional requirements may be specified by the national health authorities, the national authorities responsible for the protection of labour and similar authorities.

NOTE 103 — This standard does not apply to:

- a) stationary ovens and stationary grills (IS 302-2-6);
- b) warming plates (IS 302-2-12);

- c) frying pans and deep fat fryers (IS 302-2-13);
- d) microwave ovens (IS 302-2-25);
- e) barbecues for outdoor use (Indian Standard not available);
- f) appliances intended for commercial catering; and
- g) 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).

2 REFERENCES

This clause of Part 1 is applicable except as follows:

Addition

<i>IS No.</i>	<i>Title</i>
9000 (Part 11) : 1993	Basic environmental testing procedures for electronic and electrical items: Part 11 Salt mist test

3 TERMINOLOGY

This clause of Part 1 is applicable except as follows.

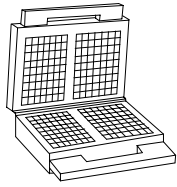
3.1.9 Replacement

Normal Operation — Operation of the appliance as specified in the following subclauses.

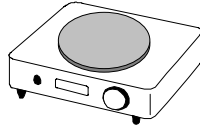
NOTE 101 — Appliances not mentioned but which nevertheless perform one of the functions are operated as specified for this function as far as possible.

3.1.9.101 Toasters are loaded with the maximum number of slices of white bread specified in the instructions and operated in cycles, each cycle consisting of an operating period and a rest period. The bread is approximately 24 hold and the dimensions of the slices are approximately 100 mm × 100 mm × 10 mm. The rest periods have a duration of 30 s or the minimum period needed for the resetting of a control, whichever is longer. The slices of bread are replaced during each rest period. The operating period is established by adjusting controls to give the bread a golden-brown colour. For toasters without a control, each operating period is terminated as soon as the colour of the bread turns golden-brown.

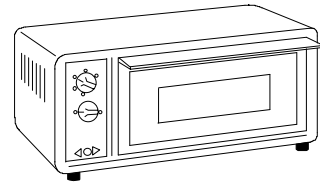
Toasters incorporating a device for heating rolls are loaded with the maximum number of rolls specified in the instructions. The toaster is operated in cycles, each



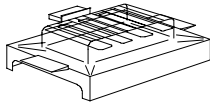
A



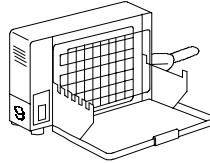
B



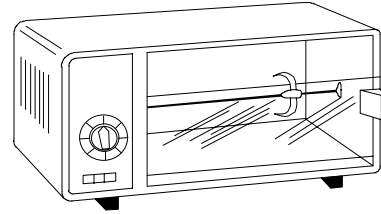
C



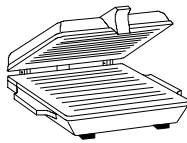
D



E



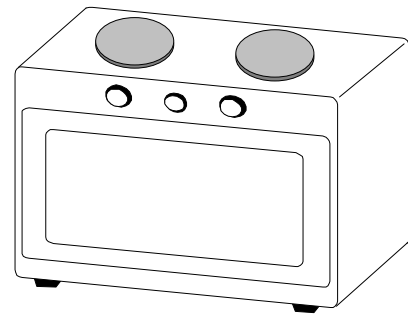
F



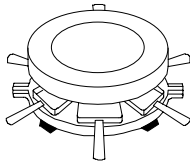
G



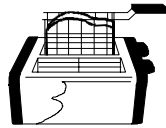
H



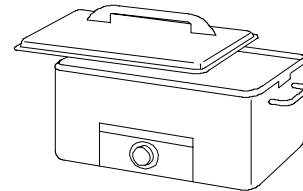
I



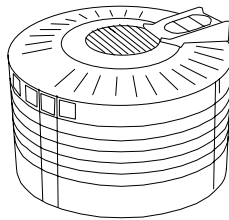
J



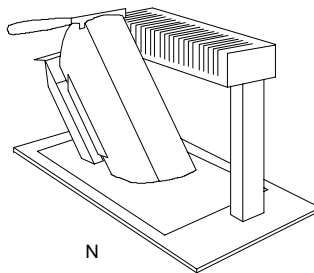
K



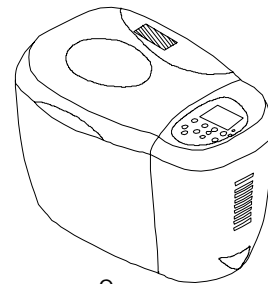
L



M



N



O

Key

A = waffle iron
 B = hotplate
 C = oven
 D = barbecue
 E = radiant grill

F = rotary grill
 G = contact grill
 H = griddle
 I = cooker
 J = raclette grill

K = toaster and sandwich-toasting attachment
 L = roaster
 M = food dehydrator
 N = raclette appliance
 O = Breadmaker

FIG. 101 EXAMPLES OF APPLIANCES

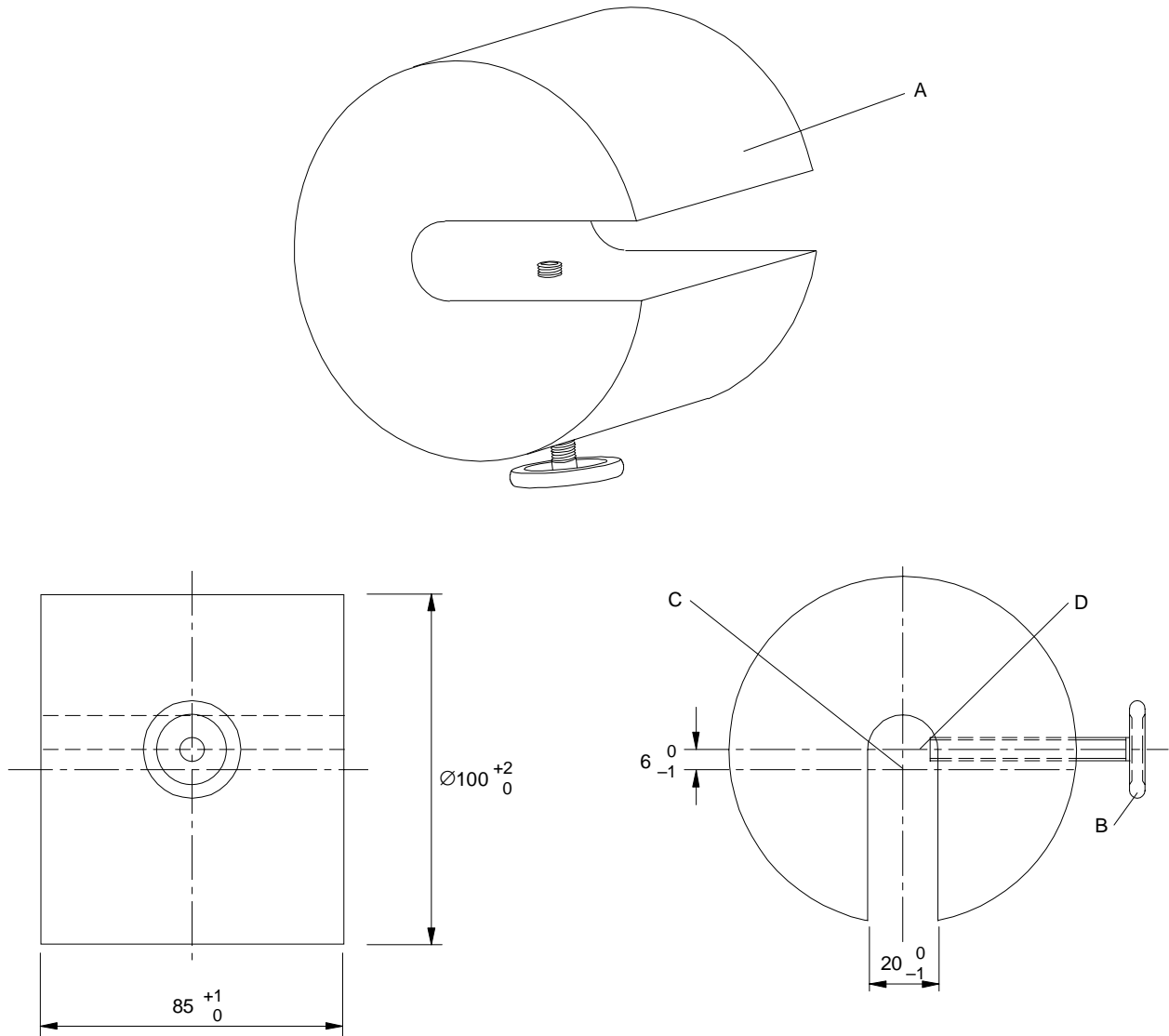
cycle consisting of an operating period followed by a rest period of 30 s when the rolls are turned or replaced. The control is adjusted in accordance with the instructions. If instructions are not given, the control is adjusted for the toasting operation.

Sandwich-toasting attachments are loaded with one or more sandwiches that are positioned in accordance with the instructions to produce the most unfavourable result. Each sandwich comprises two slices of white bread filled with a single slice of suitable cheese having

an area equal to a slice of bread and a thickness of approximately 5 mm. The toaster is then operated in accordance with the instructions in cycles, each cycle consisting of a toasting operation followed by a rest period of 30 s, or the minimum period needed for the resetting of a control, whichever is longer.

NOTE — Processed cheese and other cheeses that readily melt when heated are suitable.

3.1.9.102 Rotary grills are operated with the load on the rotating spit shown in Fig. 102.



All dimensions in millimetres.

Key

A = load, mass approximately 4.5 kg
 B = fixing screw

C = axis of load
 D = axis of fixing screw

NOTE — The load is positioned on the rotary spit so that the fixing screw contacts the diameter of the spit.

FIG. 102 LOAD FOR TESTING ROTATING SPITS

3.1.9.103 Waffle irons having a thermostat are operated with the thermostat adjusted to the highest setting. Other waffle irons are operated so that the temperature at the centre of the heated surface is maintained at $210^{\circ}\text{C} \pm 15^{\circ}\text{C}$ by switching the supply on and off.

3.1.9.104 Ovens are operated with the door closed. Ovens having a thermostat are operated so that the mean temperature in the centre of the cavity is maintained at $240^{\circ}\text{C} \pm 4^{\circ}\text{C}$ or at the value obtained with the thermostat adjusted to its highest setting, if this result in a lower temperature. Other ovens are operated so that the temperature in the centre of the cavity is maintained at $240^{\circ}\text{C} \pm 15^{\circ}\text{C}$ by switching the supply on and off.

3.1.9.105 Roasters are operated with the lid closed. The mean temperature in the centre of the container is maintained at $240^{\circ}\text{C} \pm 4^{\circ}\text{C}$, if necessary by switching the supply on and off.

3.1.9.106 Radiant grills and rotary grills are operated with the controls adjusted in accordance with the instructions, or if instructions are not provided with the controls adjusted to the highest setting. Doors or lids are open unless otherwise specified in the instructions.

Contact grills having a thermostat are operated with the thermostat adjusted to the highest setting. Other contact grills are operated so that the temperature at the centre of the heated surface is maintained at $275^{\circ}\text{C} \pm 15^{\circ}\text{C}$ by switching the supply on and off.

Raclette grills are operated with doors or lids open, unless otherwise specified in the instructions. Controls are adjusted in accordance with the instructions, pans being in position or removed, whichever is more unfavourable.

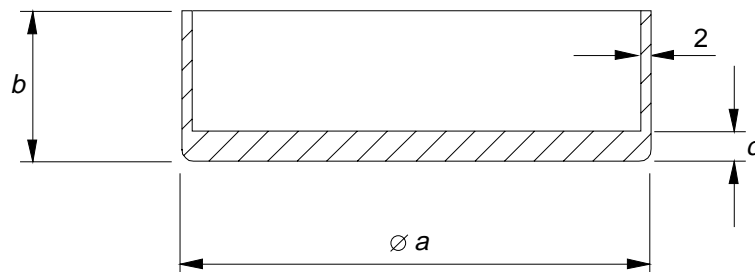
3.1.9.107 Barbecues are operated with food supports in the lowest position. Controls are adjusted to the highest setting, any covers or shields being positioned in accordance with the instructions.

NOTE — Barbecues are operated without water even if the use of water is recommended.

3.1.9.108 Hotplates, other than induction hotplates, are operated with vessels containing water. The vessels are made of unpolished commercial quality aluminium, have a flat bottom and are covered with a lid. A suitable vessel is specified in Fig. 103. Controls are adjusted to their highest setting until the water boils and then adjusted so that the water simmers. Water is added to maintain the level during boiling.

NOTE 1—The lid is positioned so that steam does not affect the test.

Induction hotplates are operated with vessels, as specified in Fig. 104, containing cooking oil. Controls are adjusted to their highest setting until the oil temperature reaches $180^{\circ}\text{C} \pm 4^{\circ}\text{C}$ and are then adjusted so that this temperature is maintained. The oil temperature is measured 1 cm above the centre of the bottom of the vessel.



All dimensions in millimetres.

Diameter of Cooking Zone	Approximate Dimension		
	a	b	c
≤110	110	140	8
>110 ≤ 145	145	140	8
>145 ≤ 180	180	140	9
>180 ≤ 220	220	120	10
>220 ≤ 300	300	100	10

NOTE — The maximum concavity of the vessel is to be not more than 0.05 mm. The base of the vessel is not to be convex.

FIG. 103 VESSEL FOR TESTING HOTPLATES

For all hotplates, the diameter of the bottom of the vessel is approximately equal to the diameter of the cooking zone and the quantity of liquid is specified in Table 101. The vessel is positioned centrally on the cooking zone.

NOTE 2 — If several cooking zones are marked for one hotplate, the most unfavourable zone is used for the test.

NOTE 3 — For non-circular cooking zones, the smallest non-circular vessel is used that will cover the cooking zone as far as possible, taking into account the hob rim and other vessels. The quantity of liquid is determined on the basis of the minor diameter of the cooking zone.

3.1.9.109 Raclette appliances are operated with the controls adjusted in accordance with the instructions, or if instructions are not provided, with the controls adjusted to the highest setting.

3.1.9.110 Food dehydrators are operated empty.

3.1.9.111 Breadmakers are operated using the most unfavourable cycle and ingredients specified in the instructions.

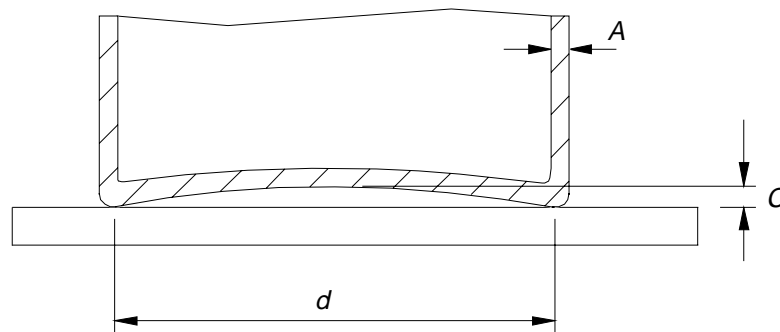
NOTE — The most unfavourable cycle may be for a function such as jam-making that allows the heating element and the kneading motor to operate simultaneously.

3.101 Toaster — Appliance intended for toasting slices of bread by radiant heat.

3.102 Waffle Iron — Appliance having two heated hinged plates that are shaped to contain batter.

3.103 Oven — Appliance having a heated cavity with a door and constructed so that food that may be in a container can be placed on a shelf.

3.104 Roaster — Appliance having a heated container



Key

A = base and wall thickness, $2 \text{ mm} \pm 0.5 \text{ mm}$
C = maximum concavity

d = diameter of the flat area of the base

NOTE — The vessel is made of low carbon steel having a maximum carbon content of 0.08 percent. It is cylindrical without metallic handles or protrusions. The diameter of the flat area of the base of the vessel is to be at least the diameter of the cooking zone. The maximum concavity of the base of the vessel is $0.006 d$. The base of the vessel is not to be convex.

FIG. 104 VESSEL FOR TESTING INDUCTION HOTPLATES

Table 101 Quantity of Liquid in the Vessel

(Clause 3.1.9.108)

Sl No.	Diameter of Cooking Zone mm	Quantity of Water or Oil l
(1)	(2)	(3)
i)	≤ 110	0.6
ii)	> 110 and ≤ 145	1.0
iii)	> 145 and ≤ 180	1.5
iv)	> 180 and ≤ 220	2.0
v)	> 220 and ≤ 300	3.0

with a lid and constructed so that food can be placed in it.

3.105 Rotary Grill — Appliance having a visibly glowing heating element and a rotating spit to support the food.

NOTE — A rotary grill is also known as a rotisserie.

3.106 Radiant Grill — Appliance having a visibly glowing heating element and a support on which food can be placed.

NOTE — A radiant grill may be placed in a compartment with or without a door.

3.107 Contact Grill — Appliance having a heated surface on which food is placed. It may have a second heated surface to cover the food.

NOTE — A contact grill with only one heated surface is known as a griddle.

3.108 Sandwich-Toasting Attachment — Accessory for use with a toaster for toasting sandwiches.

3.109 Raclette Grill — Appliance for melting slices of cheese placed in small pans positioned under the heating element.

NOTE — Raclette grills may have a surface that is used as a griddle.

3.110 Raclette Appliance — Radiant grill for melting the surface of a large piece of cheese.

3.111 Barbecue — Radiant grill having a heating element located under the food support.

3.112 Hotplate — Appliance having one or more heating units on which vessels can be placed for cooking purposes.

NOTE — Hotplates do not incorporate an oven or grill.

3.113 Induction Hotplate — Hotplate that can heat at least one metallic vessel by means of eddy currents.

NOTE — The eddy currents are induced in the bottom of the vessel by the electromagnetic field of a coil.

3.114 Cooker — Appliance incorporating a hotplate and an oven.

NOTE — Cookers may incorporate a grill.

3.115 Food Dehydrator — Appliance for dehydrating food by means of heated air.

NOTE — The appliance may incorporate a fan.

3.116 Heating Unit — Part of the appliance that fulfils an independent cooking or warming function.

3.117 Cooking Zone — Area marked on a hotplate where the vessel is placed for heating food.

3.118 Touch Control — Control actuated by contact or proximity of a finger, with little or no movement of the contact surface.

3.119 Breadmaker — Appliance intended for making bread comprising a heated compartment incorporating dough kneading facilities.

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

If it is evident from the construction of the appliance that the test of one function will produce more favourable results than another, this function is not tested.

5.6 Addition

If two or more cooking functions can be performed simultaneously, they are tested at the same time.

5.101 Induction hotplates are operated as specified for motor-operated appliances. Other appliances are tested as specified for heating appliances, even if they incorporate motors.

6 CLASSIFICATION

This clause of Part 1 is applicable except as follows.

6.2 Addition

Appliances intended for outdoor use shall be at least IPX4.

7 MARKING AND INSTRUCTIONS

This clause of Part 1 is applicable except as follows.

7.1 Addition

The rated power input or rated current of induction hotplates shall also be marked.

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

‘Do not immerse beyond this level’.

If cookers, portable ovens and rotary grills have accessible metal surfaces, other than working surfaces, that have a temperature rise exceeding 90 K during the test of 11, they shall be marked with symbol as given in 7.6 with the substance of the following:

‘CAUTION — Hot surface’.

7.6 Addition

‘CAUTION — Hot surface’.

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.

The instructions for appliances intended for outdoor use shall include the substance of the following:

- a) The appliance is suitable for outdoor use;
- b) The supply cord should be regularly examined for signs of damage, and if the cord is damaged, the appliance shall not be used;
- c) The appliance shall be supplied through a residual current device (RCD) having a rated residual operating current not exceeding 30 mA; and
- d) The appliance is to be connected to a socket-outlet having an earthing contact (for class I appliances).

The instructions for appliances having accessible metal surfaces, other than working surfaces, that have a temperature rise exceeding 90 K during the test of 11 shall include the substance of the following:

The temperature of accessible surfaces may be high when the appliance is operating.

If symbol shown in 7.6 is marked on appliances, the instructions shall state that the surfaces are liable to get hot during use.

The instructions shall state that appliances are not intended to be operated by means of an external timer or separate remote-control system.

The instructions shall include details on how to clean surfaces in contact with food. For toasters, they shall include details on how to remove breadcrumbs, when applicable.

The instructions for toasters shall include the substance of the following:

The bread may burn, therefore do not use the toaster near or below combustible material, such as curtains.

The instructions for barbecues shall include the substance of the following:

‘**WARNING** — Charcoal or similar combustible fuels shall not be used with this appliance’.

The instructions for barbecues intended to be used with water shall state the maximum quantity of water to be poured into the appliance.

The instructions for hotplates having surfaces of glass-ceramic or similar material protecting live parts shall include the substance of the following:

‘**WARNING** — If the surface is cracked, switch off the appliance to avoid the possibility of electric shock’.

The instructions for induction hotplates shall include the substance of the following:

Metallic objects such as knives, forks, spoons and lids should not be placed on the hotplate since they can get hot.

The instructions for breadmakers shall state the maximum quantities of flour and raising agent that may be used.

7.14 Addition

The height of the triangle used with symbol shown in 7.6 shall be at least 12 mm.

7.15 Addition

The marking specified for hot surfaces shall be visible when the appliance is operated as in normal use.

7.101 BIS Certification Marking

The appliances may also be marked with the Standard Mark.

7.102 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.

8.1.1 Addition

For toasters having a crumb tray, the test finger is not applied through the crumb-tray opening to live parts that are disconnected by the operation of a double pole switch. However, it shall not be possible to touch these parts with test probe 41 of IS 1401.

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 except as follows.

10.1 Addition

The power input of induction hotplates is measured separately.

10.2 Addition

The current of induction hotplates is measured separately.

11 HEATING

This clause of Part 1 is applicable except as follows.

11.1 Addition

Compliance for toasters is also checked by the test of **11.101**.

11.2 Addition

Radiant grills and raclette grills that are loaded from the front, rotary grills, ovens, breadmakers, cookers and hotplates are placed with their backs as near as possible to one of the walls of the test corner and away from the other wall. Other appliances are placed away from the walls.

11.3 Addition

NOTE 101 — If the magnetic field of an induction hotplate unduly influences the results, the temperature rises can be determined using platinum resistances with twisted connecting wires or any equivalent means.

11.4 Addition

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

11.7 Replacement

Breadmakers are operated for one cycle.

Toasters are operated for 15 min. Unless they are constructed to toast only one slice of bread, they are tested for a further 5 min with one slice of bread inserted in the most unfavourable position.

Toasters incorporating a device for heating rolls are operated for five cycles.

Toasters having sandwich-toasting attachments are also tested for five cycles of operation. They are also tested for one cycle of operation with the sandwich in the most unfavourable position.

Radiant grills are operated for a period of 30 min, for

the maximum period indicated in the instructions or for the maximum period allowed by a timer, whichever is the longer.

Ovens, roasters and rotary grills are operated until steady conditions are established but for not longer than 60 min. However, if a rotary grill has a timer, the timer is reset as many times as necessary to establish steady conditions.

Contact grills having thermostats are operated until steady conditions are established. Other contact grills are operated for 30 min after the centre of the heating surface attains a temperature of 275°C.

Waffle irons are operated until steady conditions are established but for not longer than 30 min after the centre of the heating surface attain a temperature of 210°C.

Raclette grills, barbecues and food dehydrators are operated until steady conditions are established.

Induction hotplates are operated for 30 min. Other hotplates are operated for 60 min.

For cookers, combinations of heating units that can be energised simultaneously are tested together, the heating units being switched on for the duration specified.

NOTE 101 — If the appliance is subjected to more than one test, it is cooled to room temperature before each test.

11.8 Modification

For radiant grills, rotary grills, raclette grills, hotplates and cookers, instead of 65 K, the temperature rise of the wall of the test corner shall not exceed 75 K.

Addition

When an appliance connector incorporates a thermostat, the temperature rise limit for the pins of the appliance 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.

Cheese used in sandwich toasting attachments shall not flow into places where it could give rise to a hazard, such as reducing clearances or creepage distances below the values specified in **29**.

11.101 Toasters in which the bread is inserted through the top are operated for three cycles under normal operation at rated power input.

The temperature rise of accessible surfaces of metallic sides that are at a height lower than 25 mm below the top surface shall not exceed 90 K.

NOTE — There are no temperature rise limits specified for other surfaces.

12 VOID**13 LEAKAGE CURRENT AND ELECTRIC STRENGTH AT OPERATING TEMPERATURE**

This clause of Part 1 is applicable except as follows.

13.1 Addition

If a grill is incorporated in an oven, either the oven or the grill is operated, whichever is more unfavourable.

13.2 Addition

If there is earthed metal between live parts and the surface of glass-ceramic or similar material of hotplates, the leakage current is measured between live parts and each vessel in turn connected to the earthed metal. It shall not exceed 0.75 mA. If there is no earthed metal, the leakage current, measured between live parts and each of the vessels in turn, shall not exceed 0.25 mA.

13.3 Addition

If there is earthed metal between live parts and the surface of glass-ceramic or similar material of hotplates, a test voltage of 1 000 V is applied between live parts and all the vessels connected to the earthed metal. If there is no earthed metal, a test voltage of 3 000 V is applied between live parts and the vessels.

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

For ovens, 0.5 l of water containing approximately 1 percent sodium chloride (NaCl) is poured uniformly over the bottom surface of the oven.

Hotplates and cookers are positioned so that the top surface is horizontal. A vessel having the largest diameter shown in Fig. 103, which does not exceed the diameter of the cooking zone, is completely filled with water containing approximately 1 percent NaCl and positioned centrally over the cooking zone. A further quantity of approximately 0.5 l of the solution is poured steadily into the vessel over a period of 15 s. The test is carried out on each cooking zone in turn, after removing any residual solution from the appliance.

If the heating element of a hotplate incorporates a thermal control, 0.02 l of the saline solution is poured

over the cooking zone so that it flows over the control. A vessel is then placed on the cooking zone to depress any movable part.

For hotplates having ventilating openings in the heated surface, 0.2 l of the saline solution is poured steadily through the funnel onto the ventilating openings. The funnel has an outlet diameter of 8 mm and is positioned vertically with the outlet 200 mm above the heated surface. The funnel is positioned above the ventilating openings so that the solution enters the appliance in the most unfavourable way.

NOTE 101 — If the opening is protected, the funnel is positioned so that the solution falls onto the heated surface as close as possible to the opening.

For other appliances with heating elements that are covered by vessels in normal use, the spillage test is carried out by steadily pouring saline solution onto the heating surface over a period of 1 min, 0.1 l of solution being used for every 100 cm² of the heating surface.

The spillage test is not carried out on roasters.

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 15°C and 30°C, unless they are marked with the maximum level of immersion, in which case they are immersed 5 cm 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 to be 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

IS 302-2-9 : 2009

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

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

16 LEAKAGE CURRENT AND ELECTRIC STRENGTH

This clause of Part 1 is applicable except as follows.

16.1 Addition

For hotplates, the tests are carried out with a vessel as specified for normal operation placed on each cooking zone.

16.2 Addition

If there is earthed metal between live parts and the surface of glass-ceramic or similar material of hotplates, the leakage current is measured between live parts and each vessel in turn connected to the earthed metal. It shall not exceed 0.75 mA. If there is no earthed metal, the leakage current, measured between live parts and each of the vessels in turn, 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 of hotplates, a test voltage of 1 250 V is applied between live parts and all the vessels connected to the earthed metal. If there is no earthed metal, a test voltage of 3 000 V is applied between live parts and the vessels.

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

The tests of **19.4** and **19.5** are only applicable to:

- a) breadmakers;
- b) contact grills;

- c) food dehydrators; and
- d) the following appliances, if they incorporate a timer or if their instructions indicate a cooking operation longer than 1 h:
 - 1) ovens,
 - 2) roasters,
 - 3) hotplates,
 - 4) cookers, and
 - 5) rotary grills.

Toasters are also subjected to the tests of **19.101** and **19.102**.

Induction hotplates are also subjected to the tests of **19.103** and **19.104**.

19.2 Addition

Radiant grills and raclette grills that are loaded from the front, rotary grills, ovens, hotplates and cookers are placed as near to the walls of the test corner as possible.

Appliances are tested empty. Lids and doors are open or closed, whichever is more unfavourable. Detachable parts are in position or removed, whichever is more unfavourable.

Hotplates are operated without a vessel and with the controls adjusted to the highest setting.

Induction hotplates are operated under the conditions of **11** but with empty vessels, controls being adjusted to the highest setting.

Cookers are only tested with the heating unit that results in the most unfavourable conditions, their controls being adjusted to the highest setting. However ovens are operated if they do not have an indicating lamp to show when they are switched on, controls being adjusted to the highest setting.

NOTE 101 — A lamp used for illuminating the oven, which is visible through the door and is automatically switched on and off with the oven, is considered to be an indicating lamp.

19.4 Addition

Air-circulating fans of food dehydrators are disconnected.

19.8 Not applicable.

19.10 Not applicable.

19.13 Addition

During the test of **19.102** any flames or smokes from the bread are ignored.

The temperature rise of the windings of induction hotplates shall not exceed the values specified in **19.7**.

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

19.101 Toasters are operated at rated power input and under normal operation, but without bread, for six cycles of operation. The appliance is then allowed to cool to approximately room temperature.

This test is carried out 500 times.

The mechanism shall operate satisfactorily and no sustained arcing shall occur. Electrical connections shall not work loose and the appliance shall withstand the electric strength test of **16.3**.

NOTES

- 1 Forced cooling may be used.
- 2 A simulated load may be necessary to operate the mechanism.
- 3 Subclause **19.13** does not apply.

19.102 Toasters, loaded with the bread specified for normal operation, are operated at rated power input. The ejector mechanism is prevented from releasing and the supply is maintained to the heating elements after the timer has completed its cycle. The test is terminated after any fire has extinguished, after which any residual bread is removed from the toaster.

19.103 Induction hotplates are supplied at rated voltage and operated with a steel disk placed on the centre of the cooking zone. The disk has a thickness of 6 mm and the smallest diameter, rounded up to the nearest centimetre, which allows the appliance to operate.

19.104 Induction hotplates are supplied at rated voltage and operated under normal operation but with any control that limits the temperature during the test of **11** short-circuited.

NOTE — If the appliance incorporates more than one control, they are short circuited in turn.

The temperature rise of the oil shall not exceed 270 K.

20 STABILITY AND MECHANICAL HAZARDS

This clause of Part 1 is applicable except as follows.

20.101 Ovens having doors with a horizontal hinge at their lower edge and on which a load is likely to be placed shall have adequate stability.

Compliance is checked by the following test.

The oven is placed on a horizontal surface with the door open and a mass of 3.5 kg is gently placed on the geometric centre of the door.

NOTE — A sandbag may be used for the load.

The oven shall not tilt.

This test is not carried out on ovens with doors having a dimension less than 225 mm from the hinge to the

opposite edge or on ovens with doors which cannot support dishes in the fully open position.

21 MECHANICAL STRENGTH

This clause of Part 1 is applicable except as follows.

21.1 Addition

For appliances intended for outdoor use, the impact energy is increased to 0.7 J.

If the appliance incorporates visibly glowing heating elements enclosed in glass tubes, the blows are applied to the tubes as mounted in the appliance if they are:

- a) located at the top of the oven and accessible to test probe 41 of IS 1401, and
- b) located elsewhere in the oven and accessible to test probe B of IS 1401.

For hotplates having surfaces of glass-ceramic or similar material, three blows are applied to parts of the surface that are not exposed to impacts during the test of **21.101**, the impact energy being $0.70 \text{ J} \pm 0.05 \text{ J}$. The blows are not applied to surfaces within 20 mm of knobs.

NOTE **101** — If the surface comprises a single piece of material, except for the outer frame, this test is not carried out.

21.101 Surfaces of hotplates of glass-ceramic or similar material shall withstand the stresses liable to occur in normal use.

Compliance is checked by the following test.

The hotplate is operated at rated power input with its control adjusted to the highest setting. Induction hotplates are operated as specified in **11**. When steady conditions are established, the hotplate is switched off and a vessel with its base horizontal is dropped from a height of 150 mm onto the cooking zone. The vessel has a copper or aluminium base that is flat over a diameter of $120 \text{ mm} \pm 10 \text{ mm}$, its edges being rounded with a radius of at least 10 mm. It is uniformly filled with at least 1.3 kg of sand or shot so that the total mass is $1.80 \text{ kg} \pm 0.01 \text{ kg}$.

The vessel is dropped 10 times onto each cooking zone. It is removed and the appliance is operated at rated power input until steady conditions are established.

A quantity of $1 \text{ }^{+0.1}_0$ litre of water containing approximately 1 percent NaCl is poured steadily over the hotplate.

The appliance is then disconnected from the supply. After 15 min all excess liquid is removed and the appliance is allowed to cool to approximately room temperature. The same quantity of the saline solution is poured over the hotplate after which excess liquid is removed again.

IS 302-2-9 : 2009

The surface of the hotplate shall not be broken and the appliance shall withstand the electric strength test of **16.3**.

22 CONSTRUCTION

This clause of Part 1 is applicable except as follows.

22.24 Addition

Heating elements shall be constructed or supported so they are unlikely to become displaced in normal use.

Compliance is checked by inspection.

22.101 Radiant grills shall not incorporate a timer that is intended to delay the operation of a heating element, unless they have a thermostat and are incorporated in an oven or other compartment.

Compliance is checked by inspection.

22.102 Barbecues shall not have bare heating elements.

Bare heating elements for ovens shall only be located at the top of the heated compartment.

Compliance is checked by inspection.

22.103 Oven vents shall be constructed so that they do not discharge moisture or grease in such a way that clearances and creepage distances are affected.

Compliance is checked by inspection.

22.104 Ovens shall be constructed so that shelves can easily slide in the supports and do not fall out of position when the sides are displaced as much as possible.

Compliance is checked by inspection and by manual test.

22.105 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.

22.106 Grills and barbecues shall be constructed so that their heating elements are fixed in position or prevented from operating when they are not in their normal position of use.

Compliance is checked by inspection.

22.107 Hotplates shall be constructed so that heating elements are prevented from rotating about a vertical

axis and are adequately supported in all positions of adjustment of their supports.

NOTE — If a heating element is clamped by a nut on a central stud, an additional means is required to prevent its rotation.

Compliance is checked by inspection.

22.108 Hotplates shall be constructed so that inadvertent operation of touch controls is unlikely if this could give rise to a hazardous situation due to:

- a) spillage of liquids, including that caused by a vessel boiling over; and
- b) a damp cloth placed on the control panel.

Compliance is checked by the following test, the appliance being supplied at rated voltage.

Sufficient water to completely cover the control panel to a depth not exceeding 2 mm, with a minimum of 140 ml, is poured steadily over the control panel so that bridging occurs between combinations of touch pads.

The test is carried out with each heating element energized in turn and then without energizing any heating element.

A cloth having a mass between 140 g/m² and 170 g/m² and dimensions of 400 mm × 400 mm is folded four times into a square pad and saturated with water. It is placed over the control panel in any position.

There shall be no inadvertent operation of any heating element for longer than 10 s.

22.109 Hotplates incorporating touch controls shall require at least two manual operations to switch on a heating element but only one to switch it off.

NOTE — Touching the contact surface at the same point twice is not considered to be two operations.

Compliance is checked by manual test.

22.110 Induction hotplates shall be constructed so that they can only be operated with a suitable vessel placed on the cooking zone.

Compliance is checked by the following test, the appliance being supplied at rated voltage.

An iron bar 2 mm thick having dimensions 100 mm × 20 mm is placed in the most unfavourable position on the cooking zone. The controls are adjusted to their maximum setting.

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

22.111 Heating elements in breadmakers shall be located so that they are not exposed to dough that may rise over the edge of the dough container during normal use of the appliance.

Compliance is checked by inspection.

22.112 Reconnection of the power supply to a breadmaker after an interruption shall not result in a fire due to an extended heating period.

Compliance is checked by the following test.

All batteries are removed and the breadmaker is supplied at rated voltage and operated in its heating mode without a load.

After 1 min, the power supply is interrupted for a period of 5 min and then restored. The appliance shall continue to operate in its heating mode from the same point in the cycle, or a manual operation shall be required to restart it.

If the appliance continues to operate automatically, the test is repeated but with a 5 min longer period of interruption. If the appliance still continues to operate automatically, the test is repeated but with the periods of interruption increased by at least 5 min each time.

The appliance shall eventually require a manual operation to restart it.

23 INTERNAL WIRING

This clause of Part 1 is applicable except as follows.

23.3 Addition

For appliances which can be opened to two positions, 1 000 flexings are made with the part moved to the fully open position and the remaining flexings to the other position.

24 COMPONENTS

This clause of Part 1 is applicable except as follows.

24.1.3 Addition

Switches controlling heating elements of hotplates are subjected to 50 000 cycles of operation.

24.1.4 Modification

The following number of cycles of operation apply:

- | | |
|--|---------|
| a) Energy regulators: | |
| 1) for automatic action | 100 000 |
| 2) for manual action | 10 000 |
| b) Self-resetting thermal cut-outs for heating elements of glass-ceramic hotplates | 100 000 |

24.1.5 Addition

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

- 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;
- 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;
- the breaking-capacity test of **19** is carried out using the inlet of the appliance; and
- 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.

24.101 Thermostats and energy regulators incorporating an off position shall not switch on as a result of variations in ambient temperature.

Compliance is checked by the following test that is carried out on three devices.

The device, set at the off position, is placed for 2 h in an ambient temperature of -20_{-5}^0 °C and then at:

- t °C, where t is the temperature according to the T-marking; and
- 55°C, for devices without a T-marking.

During the test, the off position shall be maintained.

A test voltage of 500 V is applied across the contacts for 1 min. No breakdown shall occur.

24.102 Thermal cut-outs incorporated in food dehydrators for compliance with **19.4** shall not be self-resetting.

Compliance is checked by inspection.

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 that does not comply with the standard sheets of IS/IEC 60320-1 shall be supplied with a cord set.

25.7 Addition

The supply cord of appliances intended for outdoor use shall be polychloroprene sheathed.

26 TERMINALS FOR EXTERNAL CONDUCTORS

This clause of Part 1 is applicable.

27 PROVISION FOR EARTHING

This clause of Part 1 is applicable except as follows.

27.1 Addition

Earthing continuity shall not depend upon flexible metallic tubes, coiled springs or cord anchorages.

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

29.3 Addition

This requirement does not apply to the sheath of a visibly glowing heating element that is inaccessible to test probe 41 of IS 1401.

30 RESISTANCE TO HEAT AND FIRE

This clause of Part 1 is applicable except as follows.

30.1 Addition

Temperature rises occurring during the test of 19.102 are not taken into account.

30.2 Addition

The tests of 30.2.3 are applicable to:

- a) breadmakers;
- b) food dehydrators; and
- c) the following appliances, if they incorporate a timer or if their instructions indicate a cooking operation longer than 1 h:
 - 1) cookers,
 - 2) ovens,
 - 3) roasters, and
 - 4) rotary grills.

For other appliances, the tests of 30.2.2 are applicable.

31 RESISTANCE TO RUSTING

This clause of Part 1 is applicable except as follows.

Addition

For appliances intended for outdoor use, compliance is checked by the salt mist test, Kb of IS 9000 (Part 11), severity 2 being applicable.

Before the test, enclosures having a coating are scratched by means of a hardened steel pin, the end of which has the form of a cone with a top angle of 40°. Its tip is rounded with a radius of 0.25 mm ± 0.02 mm. The pin is loaded so that the force exerted along its axis is 10 N ± 0.5 N. The pin is held at an angle of 80°–85° to the horizontal and scratches are made by drawing the pin along the surface of the coating at a speed of approximately 20 mm/s. Five scratches are made at least 5 mm apart and at least 5 mm from the edges.

After the test, the appliance shall not have deteriorated to such an extent that compliance with this standard, in particular with 8 and 27, is impaired. The coating shall not be broken and shall not have loosened from the surface.

32 RADIATION, TOXICITY AND SIMILAR HAZARDS

This clause of Part 1 is applicable.

101 TESTS

101.1 Type Tests

The tests specified in Table 102 shall constitute the type tests and shall be carried out on a sample selected

Table 102 Schedule of Type Tests

SI 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

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.

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:

<i>Test</i> (1)	<i>Clause Reference</i> (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

The following shall constitute the routine tests:

<i>Test</i> (1)	<i>Clause Reference</i> (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

(Normative)

AGEING TEST ON MOTORS

MODIFICATION

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

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 1986* to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publications), BIS.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards : Monthly Additions'.

This Indian Standard has been developed from Doc No.: ETD 32 (5973).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones : 2323 0131, 2323 3375, 2323 9402 Website: www.bis.org.in

Regional Offices:

	Telephones
Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg NEW DELHI 110002	{ 2323 7617 2323 3841
Eastern : 1/14 C.I.T. Scheme VII M, V. I. P. Road, Kankurgachi KOLKATA 700054	{ 2337 8499, 2337 8561 2337 8626, 2337 9120
Northern : SCO 335-336, Sector 34-A, CHANDIGARH 160022	{ 60 3843 60 9285
Southern : C.I.T. Campus, IV Cross Road, CHENNAI 600113	{ 2254 1216, 2254 1442 2254 2519, 2254 2315
Western : Manakalaya, E9 MIDC, Marol, Andheri (East) MUMBAI 400093	{ 2832 9295, 2832 7858 2832 7891, 2832 7892

Branches: AHMEDABAD. BANGALORE. BHOPAL. BHUBANESHWAR. COIMBATORE. DEHRADUN. FARIDABAD. GHAZIABAD. GUWAHATI. HYDERABAD. JAIPUR. KANPUR. LUCKNOW. NAGPUR. PARWANOO. PATNA. PUNE. RAJKOT. THIRUVANANTHAPURAM. VISAKHAPATNAM.