**IS 302-2-12 : 2020**

***Indian Standard***

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES – SAFETY

PART 2 PARTICULAR REQUIREMENTS

SECTION 12: Particular requirements for warming plates and similar appliances

(First Revision)

ICS 13.120; 97.040.50

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**B U R E A U O F I N D I A N S T A N D A R D S**

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Electrical Appliances Sectional Committee, ETD 32

FOREWORD

This Indian Standard (Part 2/Sec 12) (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 the latest International Standard.

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 : 2019 ‘Code of practice for electrical wiring installations (*fourth revision*), as far as possible so that there is compatibility with the wiring rules when the appliance is connected to the supply mains. However, in case of any deviation, wiring rules take precedence.

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.

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

NOTE­—  This means that in such a case, it has been decided that for the part 2 standards, it is not necessary to specify particular requirements for the appliance in question over and above the general requirements.

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

NOTE—  Horizontal and generic standards covering a hazard are not applicable since they have been taken into consideration when developing the general and particular requirements for the IS 302 series of standards.

An appliance that complies with the text of this standard will not necessarily be considered to comply with the safety principles of the standard if, when examined and tested, it is found to have other features 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 the latest edition of IS 302-1 'Safety of household and similar electrical appliances : Part 1 General Requirements' and its amendments. This standard was formulated on the basis of IS 302-1 : 2008.

NOTE — When “Part 1” is mentioned in this standard, it refers to IS 302-1.

This Part 2 supplements or modifies the corresponding clauses in IS 302-1, so as to convert that standard into the Indian standard: Particular requirements for Vacuum cleaners and water-suction cleaning appliances.

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

NOTE — The following numbering system is used:

1. Subclauses, tables and figures that are numbered starting from 101 are additional to those in Part 1;
2. Unless notes are in a new subclause or involve notes in Part 1, they are numbered starting from 101, including those in a replaced clause or subclause;
3. Additional annexes are lettered AA, BB, etc.

This standard is based on IEC 60335-2-12 : 2017 (Ed. 5.2). As this standard refers to IS 302-1, the differences of IS 302-1 from IEC 60335-1 shall apply.

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 or analysis, 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*

HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES –

SAFETY

Part 2 Particular requirements

Section 12 Warming Plates and similar appliances

(*First Revision*)

# SCOPE

This clause of Part 1 is replaced by the following.

This Standard deals with the safety of electric warming plates, warming trays and similar appliances intended to keep food or vessels warm, for household and similar purposes, their rated voltage being not more than 250 V.

Appliances intended for normal household and similar use and that may also be used by laymen in shops, in light industry and on farms are within the scope of this standard. However, if the appliance is intended to be used professionally to keep vessels warm or to process food for commercial consumption, the appliance is not considered to be for household and similar use only.

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

1. persons (including children) whose
2. physical, sensory or mental capabilities; or
3. lack of experience and knowledge

prevents them from using the appliance safely without supervision or instruction;

1. children playing with the appliance.

NOTE 101 Attention is drawn to the fact that

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

NOTE 102 This standard does not apply to

1. appliances made of flexible material, such as textile material;
2. appliances intended exclusively to be used in locations where special conditions prevail, such as the presence of a corrosive or explosive atmosphere (dust, vapour or gas);
3. appliances intended exclusively for commercial catering or industrial purposes.

# NORMATIVE REFERENCES

This clause of Part 1 is applicable except as follows.

Addition:

|  |  |
| --- | --- |
| *IS Number* | *Title* |
| Doc. ETD 18 (11489) | Thermocouples – Part 1: EMF specifications and tolerances |

# 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

The appliance is operated with a shallow pan, 15 cm in diameter and filled with water to a height of at least 25 mm, placed on the heated surface. If vessels are supplied with the appliance, or specified in the instructions, these are used instead.

The appliance is operated without a pan if this condition is more unfavourable.

3.6.101 Hot Functional Surface*—*surface that is intentionally heated by an internal heat source and that has to be hot to carry out the intended function of the appliance

# GENERAL REQUIREMENT

This clause of Part 1 is applicable.

# 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.

# CLASSIFICATION

This clause of Part 1 is applicable.

# 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.

When the provisions of footnote b to Table 101 apply, the appliance shall be marked with:

1. the substance of “CAUTION: Hot surface”, or
2. symbol IEC 60417-5041 (2002-10).

7.6 Addition:

|  |  |  |
| --- | --- | --- |
|  | [symbol IEC 60417-5041 (2002-10)] | caution, hot surface |

**7.12** *Addition:*

The instructions shall include the substance of the following:

This appliance is intended to be used in household and similar applications such as:

1. staff kitchen areas in shops, offices and other working environments;
2. farm houses;
3. by clients in hotels, motels and other residential type environments;
4. bed and breakfast type environments.

NOTE 101 If the manufacturer wants to limit the use of the appliance to less than the above, this has to be clearly stated in the instructions.

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

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

The instructions for appliances having surfaces of glass-ceramic or similar material that forms part of the enclosure of live parts shall include the substance of the following:

WARNING: Do not use the appliance if the surface is cracked.

The instructions for appliances that have to be used with particular vessels that are not supplied shall specify the vessels to be used.

If symbol IEC 60417-5041 (2002-10) is marked on appliances, its meaning shall be explained and location of areas where the limits are exceeded shall be stated or shown by a drawing.

**7.14**Addition:

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

Compliance is checked by measurement.

**7.15** Addition:

The marking specified for hot surfaces shall be clearly visible when the appliance is operated as in normal use, including when actuating any switch, adjusting any control or opening a lid or door. It shall not be placed on a hot functional surface or on surfaces that are exempted from the limits of Table 101.

**7.101** **BIS Certification Marking**

The appliances may also be marked with the Standard Mark.

**7.101.1** The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the BIS Act, 2016 and the Rules and Regulations framed thereunder, and the product(s) may be marked with the Standard Mark.

# PROTECTION AGAINST ACCESS TO LIVE PARTS

This clause of Part 1 is applicable.

# STARTING OF MOTOR-OPERATED APPLIANCES

This clause of Part 1 is not applicable.

# POWER INPUT AND CURRENT

This clause of Part 1 is applicable.

# HEATING

This clause of Part 1 is applicable except as follows.

**11.2** *Modification:*

Portable appliances are placed away from the walls of the test corner*.*

11.3 Addition:

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

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

**11.7** *Replacement:*

Appliances are operated until steady conditions are established.

**11.8** *Addition:*

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

*Addition:*

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

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

|  |  |  |
| --- | --- | --- |
| Surface | Temperature rise of external accessible surfacesa  K | |
| Appliances and parts situated not more than 850 mm above the floor after installation b | Appliances and parts situated more than 850 mm above the floor after installation b |
| Bare metal  Coated metal c  Glass and ceramic  Plastic and plastic coating > 0.4 mm d, e | 38  42  51  58 | 42  49  56  62 |
| a The following surfaces or elements shall not be taken into consideration:   1. **hot functional surfaces**; 2. handles or control knobs including keypads, keyboards and the like: part of the equipment that a user needs to touch to operate or adjust the equipment. The equipment has to be installed according to the manufacturer’s instructions; 3. surfaces within 5 mm of touch controls regardless of their shape; 4. surfaces within 25 mm of the outline of the hot functional surfaces; 5. underside surfaces that are not accessible to a 75 mm diameter probe having a hemispherical end; 6. lids and covers.   b When the required values are not met, the maximum temperature rise shall not be higher than two times the values indicated.  c Metal is considered coated when a coating having a minimum thickness of 90 μm made by enamel, powder or non-substantially plastic coating is used.  d The temperature rise limit of plastic also applies for plastic material having a metal finish of thickness less than 0.1 mm.  e When the thickness of the plastic coating does not exceed 0.4 mm, the temperature rise limits of the coated metal or of glass and ceramic material apply. | | |

# VOID

# LEAKAGE CURRENT AND ELECTRIC STRENGTH AT OPERATING TEMPERATURE

This clause of Part 1 is applicable except as follows.

**13.2** *Modification:*

For appliances that are intended to be used with particular metallic vessels, the vessels are placed on the heated surface and connected to accessible metal parts. The metal foil is not in contact with theheated surface.

For other appliances, vessels are not placed on the heated surface, the metal foil being in contact with accessible surfaces of insulating material.

# TRANSIENT OVERVOLTAGES

This clause of Part 1 is applicable.

# MOISTURE RESISTANCE

This clause of Part 1 is applicable except as follows.

**15.2** *Addition:*

Appliances without containers are tested with 0.01 litre of saline solution for each 100 cm² of the heated surface. The solution is poured steadily over the surface over a period of 1 min.

NOTE 101 Appliances that can only be used for warming crockery are not subjected to this test.

**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 samples.

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 102 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 thatcould result in a reduction of clearancesandcreepage distancesbelow the values specified in Clause 29.

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

Inspection shall show that there is no trace of liquid on insulation that could result in a reduction of clearancesandcreepage distancesbelow the values specified in Clause 29*.*

# LEAKAGE CURRENT AND ELECTRIC STRENGTH

This clause of Part 1 is applicable.

# OVERLOAD PROTECTION OF TRANSFORMERS AND ASSOCIATED CIRCUITS

This clause of Part 1 is applicable.

# ENDURANCE

This clause of Part 1 is not applicable.

# ABNORMAL OPERATION

This clause of Part 1 is applicable except as follows.

**19.1** *Modification:*

Instead of being subjected to the tests of 19.2 and 19.3, appliances are subjected to the test of 19.101.

**19.101** The appliance is operated at rated power input with the heated surface completely covered with felt strips for 7 h.

The felt strips have a width of 100 mm and are lined with a single layer of textile material. The felt has a specific mass of 4 kg/m² ± 0.4 kg/m² and a thickness of approximately 25 mm. The textile material consists of pre-washed double-hemmed cotton sheet having a mass between 140 g/m² and 175 g/m² in the dry condition.

If a thermostat operates, the test is repeated with the one-third of the heated surface furthest from the temperature-sensing element covered.

# STABILITY AND MECHANICAL HAZARDS

This clause of Part 1 is applicable.

# MECHANICAL STRENGTH

This clause of Part 1 is applicable except as follows.

*Addition:*

For appliances having surfaces of glass-ceramic or similar material that forms part of the enclosure of live parts, three blows having an impact energy of 0.70 J are also applied to parts of such surfaces that are not exposed to impacts during the test of 21.101.

**21.101** Appliances having surfaces of glass-ceramic or similar material that forms part of the enclosure of live parts, shall withstand the stresses liable to occur in normal use.

Compliance is checked by the following test.

A vessel with its base horizontal is dropped from a height of 150 mm onto the surface. The vessel has a copper or aluminium base that is flat over a diameter of 120 mm ± 10 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 kg ± 0.01 kg. The vessel is dropped 10 times.

The appliance is then supplied at rated voltage and operated until steady conditions are established. A wet pad having dimensions approximately 100 mm x 100 mm is then applied to the most unfavourable part of the surface. The pad is formed from a cotton sheet 40 cm x 40 cm having a mass between 140 g/m² and 175 g/m² in the dry condition. The sheet is folded four times to form the pad, which is then soaked with water containing approximately 1 percent NaCl.

The surface shall not be broken and the appliance shall withstand the leakage current test of 16.2.

# CONSTRUCTION

This clause of Part 1 is applicable except as follows.

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

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

# INTERNAL WIRING

This clause of Part 1 is applicable.

# COMPONENTS

This clause of Part 1 is applicable except as follows.

**24.1.5** *Addition:*

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

1. 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;
2. the temperature required for the test of Clause 18 is that measured on the pins of the appliance inlet during the heating test of Clause 11 of this standard;
3. the breaking-capacity test of Clause 19 is carried out using the inlet of the appliance;
4. the temperature rise of current-carrying parts specified in Clause 21 is not determined.

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

# 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:*

Light polyvinyl chloride sheathed cord (IS 694) is allowed, irrespective of the mass of the appliance.

# TERMINALS FOR EXTERNAL CONDUCTORS

This clause of Part 1 is applicable.

# PROVISION FOR EARTHING

This clause of Part 1 is applicable.

# SCREWS AND CONNECTIONS

This clause of Part 1 is applicable.

# CLEARANCES, CREEPAGE DISTANCES AND SOLID INSULATION

This clause of Part 1 is applicable.

# RESISTANCE TO HEAT AND FIRE

This clause of Part 1 is applicable except as follows.

**30.2.2** Not applicable.

# RESISTANCE TO RUSTING

This clause of Part 1 is applicable.

# RADIATION, TOXICITY AND SIMILAR HAZARDS

This clause of Part 1 is applicable.

**101 TESTS**

**101.0 Categories of Tests**

Tests are classified as type, acceptance and routine tests.

**101.1 Type Test**

The tests specified in Table 102 shall constitute the type tests and shall be carried out on two samples of the same type and rating selected preferably at random from a regular production lot. Before commencement of the tests, the vacuum cleaners and water suction cleaning appliances shall be visually examined and inspected for obvious visual defects in respect of components, parts and their assembly, construction mechanical hazards, markings, provision of suitable terminals for supply connections, earthing and the effectiveness of screw s and connections. The external surface finish shall be even and free from finishing defects.

**101.1.1** *Criteria of Acceptance*

Both samples shall successfully pass all the type tests for proving conformity with the requirements of the standard. If any of the samples 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).

|  |  |  |
| --- | --- | --- |
| **Table 102 Schedule of Type Tests** | | |
| *( Clause 101.1 )* | | |
| Sl. No | Test | Clause Reference |
|  | Protection against access to live parts | 8 |
|  | Power input and current | 10 |
|  | Heating | 11 |
|  | Leakage current and electric strength at operating temperature | 13 |
|  | Transient over voltages | 14 |
|  | Moisture resistance | 15 |
|  | Leakage current and electric strength | 16 |
|  | Overload protection of transformers and associated circuits | 17 |
|  | Abnormal operation | 19 |
|  | Stability and mechanical hazards | 20 |
|  | Mechanical strength | 21 |
|  | Construction | 22 |
|  | Internal wiring | 23 |
|  | Components | 24 |
|  | Supply connection and external flexible cords | 25 |
|  | Terminals for external conductors | 26 |
|  | Provision for earthing | 27 |
|  | Screws and connections | 28 |
|  | Clearances, creepage distances and solid insulation | 29 |
|  | Resistance to heat and fire | 30 |
|  | Resistance to rusting | 31 |
|  | Radiation, toxicity and similar hazards | 32 |
|  |  |  |

**101.2** **Acceptance Tests**

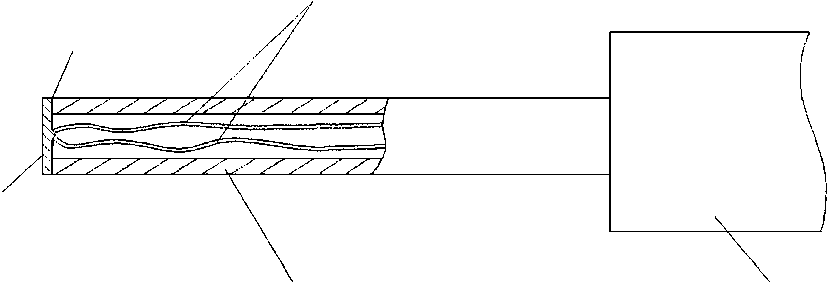
The following shall constitute the acceptance tests:

|  |  |  |
| --- | --- | --- |
| Sl. No | Test | Clause Reference |
| (1) | (2) | (3) |
|  | Protection against access to live parts | 08 |
|  | Power input and current | 10 |
|  | Heating | 11 |
|  | Leakage current and electric strength at operating temperature | 13 |
|  | Moisture resistance | 15 |
|  | Leakage current and electric strength | 16 |
|  | 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 (see 15). | | |

**101.3** **Routine Tests**

Annex A of Part 1 shall be applicable for this clause.

*IEC*



A

B

E

D

C

**Key**

A adhesive

B thermocouple wires 0.3 mm diameter according to Doc. ETD 18 (11489) Type K (chrome alumel)

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

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

E tinned copper disc: 5 mm diameter, 0.5 mm thick with flat contact face

Figure 101 – Probe for measuring surface temperatures

ANNEXES

The annexes of Part 1 are applicable.