इंटरनेट मानक

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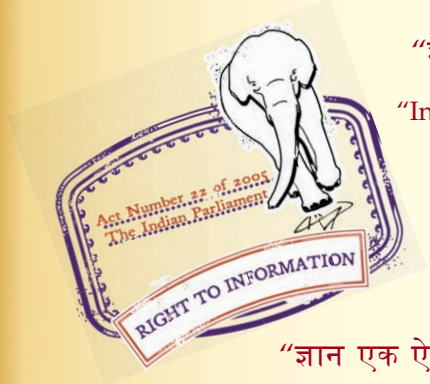
IS 302-2-35 (2011): Safety of Household and Similar Electrical Appliances, Part 2: Particular Requirements, Section 35: Electric Instantaneous Water Heaters [ETD 32: Electrical Appliances]



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Bhartṛhari—Nītiśatakam
"Knowledge is such a treasure which cannot be stolen"

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भारतीय मानक

घरेलू और समान विद्युत साधित्रों की सुरक्षा

भाग 2 विशेष अपेक्षाएँ

अनुभाग 35 बिजली के पानी गर्म करने के इँस्टेंट हीटर

(पहला पुनरीक्षण)

Indian Standard

SAFETY OF HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES

PART 2 PARTICULAR REQUIREMENTS

Section 35 Electric Instantaneous Water Heaters

(First Revision)

ICS 13.120; 97.040.50

B U R E A U O F I N D I A N S T A N D A R D S
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

September 2011 **Price Group 4**

FOREWORD

This Indian Standard (Part 2/Sec 35) (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 latest International Standard.

This standard covers the safety requirements of electric instantaneous water heaters. This standard however does not cover the performance requirements which is covered under IS 8978 : 1992 'Electrical instantaneous water heaters (*second revision*)'.

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 standard, when 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 a 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 appliance: Part 1 General requirements'. For the sake of convenience, the clauses of this standard corresponds to those of IS 302-1 : 2008, instead of reproducing full text of each clause, clauses of IS 302-1 : 2008 which is applicable (which means that relevant provisions of the clause apply) or not applicable and the sub-clauses or portion there of 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 sub-clause or part thereof 'Not applicable'.

Wherever a sub-clause 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 sub-clause of IS 302-1 : 2008 has been indicated as under:

'Addition — followed by the text of the additional matter'.

(*Continued on third cover*)

Indian Standard

SAFETY OF HOUSEHOLD AND SIMILAR ELECTRICAL APPLIANCES

PART 2 PARTICULAR REQUIREMENTS

Section 35 Electric Instantaneous Water Heaters

(First Revision)

1 SCOPE

This clause of Part 1 is replaced by the following:

This standard deals with the safety of electric instantaneous water heaters for household and similar purposes and intended for heating water below boiling temperature, their rated voltage being not more than 250 V for single-phase appliances and 415 V for other appliances.

NOTE **101** — Instantaneous water heaters incorporating bare heating elements are not included in this standard for safety reasons.

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

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

NOTES

102 — 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;

103 — This standard does not apply to:

a) Appliances for boiling water (*see* IS 302-2-15);
b) Storage water heaters (*see* IS 302-2-21);
c) Appliances intended exclusively for industrial purposes;
d) 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); and
e) Commercial dispensing appliances and vending machines.

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 while supplied with water, the flow being adjusted to attain the highest outlet water temperature without operation of the thermal cut-out.

3.101 Instantaneous Water Heater — Stationary appliance for heating water while it flows through the appliance.

NOTE — Instantaneous water heaters are referred to as water heaters.

3.102 Closed Water Heater — Instantaneous water heater intended to operate at the pressure of the water system, the flow of water being controlled by one or more valves in the outlet system.

NOTE — The operating pressure may be the output pressure of a reducing or boosting device.

3.103 Open-Outlet Water Heater — Instantaneous water heater in which the flow of water is controlled by a valve in the inlet pipe, there being no valve in the outlet pipe.

3.104 Bare-Element Water Heater — Instantaneous water heater in which uninsulated heating elements are immersed in water.

NOTE — Manufacturing and use of bare-element water heaters are not allowed for safety reason.

3.105 Rated Pressure — Water pressure assigned to the appliance by the manufacturer.

3.106 Flow Switch — Switch that operates in response to a flow of water.

3.107 Pressure Switch — Switch that operates in response to a change in pressure.

4 GENERAL REQUIREMENT

This clause of Part 1 is applicable.

5 GENERAL CONDITIONS FOR THE TESTS

This clause of Part 1 is applicable except as follows:

5.2 Addition

NOTE **101** — Additional samples may be required for the tests of **22.109**.

5.3 Addition

When the tests are carried out on a single appliance, the tests of **22.102**, **22.107**, **22.108** and **24.102** are carried out before the tests of **19**.

5.7 Addition

Water having a temperature of 20 ± 5 °C is used for the tests.

5.101 The procedure for carrying out pressure test when carried out as routine test is given in Annex A.

6 CLASSIFICATION

This clause of Part 1 is applicable except as follows:

6.1 Modification

Water heaters shall be Class I, Class II or Class III.

6.2 Addition

Water heaters shall be at least IPX1.

NOTE **101** — A higher degree of protection may be required depending on the zone in which the water heater is installed.

7 MARKING AND INSTRUCTIONS

This clause of Part 1 is applicable except as follows:

7.1 Addition

Appliances shall be marked with the rated pressure, in Pascals.

7.12 Addition

The instructions for open-outlet water heaters to be used with a spray head shall state that the spray head must be descaled regularly.

The instructions shall include the substance of the following:

Warning — Do not switch on if there is a possibility that the water in the heater is frozen.

NOTE **101** — This warning is not required if the appliance incorporates a flow switch.

7.12.1 *Addition*

The installation instructions for open-outlet water heaters shall state that the outlet must not be connected to any tap or fitting other than those specified.

If a pressure relief device is required for closed water heaters, the instructions shall state that it must be fitted during installation, unless it is incorporated in the appliance.

7.101 The water inlet and water outlet shall be identified. This identification shall not be on detachable parts. If colours are used, blue shall be used for the inlet and red for the outlet.

NOTE — Identification may be by means of arrows showing the direction of the water flow.

Compliance is checked by inspection.

7.102 BIS Certification Marking

The appliances may also be marked with the Standard Mark.

7.102.1 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 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:

8.1.5 *Addition*

NOTE **101** — The connections to the water mains and electrical supply are assumed to be in position during the test.

The requirement does not apply to wall-mounted appliances intended to be permanently connected to fixed wiring by cables having a nominal cross-sectional area more than 2.5 mm^2.

However, the cross-sectional area of the cable entry shall not exceed 25 cm^2 and there shall be no accessible live parts within the projection of the opening.

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:

11.7 Replacement

The appliance is operated until steady conditions are established.

12 VOID

13 LEAKAGE CURRENT AND ELECTRIC STRENGTH AT OPERATING TEMPERATURE

This clause of Part 1 is applicable except as follows:

14 TRANSIENT OVERVOLTAGES

This clause of Part 1 is applicable.

15 MOISTURE RESISTANCE

This clause of Part 1 is applicable except as follows:

15.1.2 *Addition*

Wall-mounted appliances are fixed at a distance of 3 mm from the mounting surface, unless the installation instructions specify a larger value.

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:

19.2 Not applicable.

19.3 Not applicable.

19.4 Addition

For open-outlet water heaters, flow switches and pressure switches that operate during the test of **11** are short-circuited, the water-control valve being adjusted to the most unfavourable position.

NOTE **101** — The closed position of the valve may be the most unfavourable position.

Flow switches of closed water heaters are short-circuited and any pressure relief device rendered inoperative, the outlet valve being closed. However, if the appliance has no flow switch and back-siphonage is likely to occur, the water heater is filled with just sufficient water to cover the heating element and operated with the outlet valve open.

NOTE **102** — Back-siphonage is not considered likely to occur, if a non-return valve or a pipe interrupter is incorporated in the appliance or if the instructions state that a non-return valve has to be included in the installation.

19.13 Addition

NOTE **101** — The water container is considered to be an enclosure.

During the test of **19.4**, the container shall not rupture and the water temperature shall not exceed,

a) 99 °C, for open-outlet water heaters having a capacity exceeding 1 litre; and
b) 140 °C, for closed water heaters having a capacity exceeding 1 litre.

20 STABILITY AND MECHANICAL HAZARDS

This clause of Part 1 is applicable.

21 MECHANICAL STRENGTH

This clause of Part 1 is applicable.

22 CONSTRUCTION

This clause of Part 1 is applicable except as follows:

22.6 Addition

The enclosure shall have a drain hole positioned so that the water can drain without impairing the electrical insulation, unless condensed water cannot accumulate within the enclosure in normal use. The hole shall be at least 5 mm in diameter or 20 mm^2 in area with a width of at least 3 mm.

Compliance is checked by inspection and by measurement.

22.101 The rated pressure of closed water heaters shall be at least 0.6 MPa.

The rated pressure of closed water heaters intended to be supplied by a pressure reducing valve shall be at least 0.1 MPa.

NOTE — The rated pressure of open-outlet water heaters is 0 Pa.

Compliance is checked by inspection.

22.102 Appliances shall withstand the water pressure occurring in normal use.

Compliance is checked by subjecting the appliance to a water pressure of,

a) twice the rated pressure, for closed water heaters; and
b) 0.15 MPa, for open-outlet water heaters.

If an open-outlet water heater incorporates a valve that regulates the water flow, a water pressure of 2 MPa is applied to the inlet of the appliance, the valve being closed.

Pressure relief devices are rendered inoperative. The pressure is raised at a rate of 0.13 MPa/s to the specified value and maintained for 5 min.

Water shall not leak from the appliance and there shall be no permanent deformation to such an extent that compliance with this standard is impaired.

22.103 Closed water heaters shall be supplied with a pressure device that prevents excessive pressure.

Compliance is checked by inspection and by subjecting the appliance to a slowly increasing water pressure.

The pressure relief device shall operate before the water pressure exceeds the rated pressure by more than 0.1 MPa.

NOTE — The pressure relief device may be fitted during installation.

22.104 The outlet of open-outlet water heaters shall be constructed so that the water flow is not limited to such an extent that the container is subjected to a significant pressure in normal use.

Compliance is checked by inspection.

NOTE — The requirement is considered to be met if the cross-sectional area of the water outlet is not less than that of the inlet.

22.105 Appliances incorporating a flow switch shall be constructed so that, if there is no water flow, the heating element cannot be switched on, and it is switched off, if the water flow ceases.

Compliance is checked by inspection and by manual test.

22.106 Closed water heaters shall incorporate a thermal cut-out that operates independently from a thermostat or flow switch. It shall only be possible to reset the thermal cut-out after removal of a non-detachable cover.

If the capacity does not exceed 1 l and the appliance incorporates a flow switch, an alternative protective device, such as a pressure switch, may be used instead of the thermal cut-out.

Compliance is checked by inspection.

22.107 Water shall not attain an excessive temperature in normal use.

Compliance is checked by the following test.

The appliance is operated at rated power input. Any regulating valve is fully opened and the water flow is adjusted so that the flow switch or pressure switch is on the verge of operating.

The temperature of the outlet water shall not be higher than 95°C and shall not exceed the temperature of the inlet water by more than 75 K.

For appliances intended to supply water for showering only, the test is carried out under normal operation and with a water pressure of 0.2 MPa. The temperature of the water at the outlet shall not exceed 55°C.

22.108 The outlet water of appliances intended to supply water for showering only shall not attain an excessive temperature due to a sudden pressure drop in the water supply.

Compliance is checked by the following test.

The appliance is supplied with water at a pressure of 0.4 MPa. It is operated at rated power input with the regulating valve adjusted so that the outlet water temperature is 25 ± 1 K above the inlet water temperature. The water pressure is then reduced to 0.2 MPa within 1 s.

The outlet water temperature shall not rise by more than 25 K within 10 s.

The outlet water temperature is measured by means of a fine-wire thermocouple placed in the centre of a plastic cylindrical receptacle having a diameter of 30 mm and a height of 12 mm. The receptacle is positioned 25 mm below the shower head.

22.109 Water containers of open-outlet water heaters having a pressure switch shall not rupture due to excessive internal pressure.

Compliance is checked by inspection and for,

a) appliances having a weak part that is ejected or ruptures when the pressure is excessive, by the test of **22.109.1**;

NOTE — Examples of weak parts are diaphragms and plugs.

b) appliances having other means for relieving pressure, by the tests of **22.109.1** and **22.109.3**;

c) appliances having heating elements that:

1) rupture before the internal pressure is excessive, or

2) cannot be energized when the internal pressure is excessive,

by the tests of **22.109.2** and **22.109.3**.

After the tests, the appliance shall comply with **8** and **16.2**.

NOTES

1 The tests simulate a blocked outlet or frozen water in the container.

2 When carrying out the tests, precautions have to be taken against the consequences of explosive rupture.

22.109.1 The appliance is filled with water, the water outlet being sealed. The water pressure is then steadily increased.

The weak part shall be ejected or rupture or the pressure relief device operates, before the internal pressure reaches 1.1 MPa.

After the pressure has been relieved, water is allowed to flow for a period of 1 min.

22.109.2 The appliance is filled with water, the water outlet being sealed and the inlet valve closed. Controls are short-circuited or open-circuited, whichever is more unfavourable. The appliance is then operated at rated power input.

The heating element shall rupture without causing a hazard unless it remains de-energized.

If the heating element ruptures, the inlet valve is opened and the water pressure steadily increased until it reaches 1.1 MPa. The pressure is maintained for 1 min.

22.109.3 The appliance is filled with water, the water inlet and outlet being sealed. Controls are short-circuited or open-circuited, whichever is more unfavourable.

The appliance is placed in an ambient having a temperature not exceeding –5 °C until the water is frozen. The appliance is then placed in the normal ambient and operated at rated power input.

NOTE — The orientation of the appliance at low temperature is the same as in normal use.

The heating element shall rupture without causing a hazard or any excessive pressure shall be relieved by means of a pressure relief device, unless the heating element remains de-energized.

The appliance is switched off and allowed to reach room temperature.

If the heating element remains de-energized or has ruptured, water is supplied through the inlet and the pressure is steadily increased until it reaches 1.1 MPa. The pressure is maintained for 1 min.

If a pressure relief device has operated, the appliance is connected to the water supply for a period of 1 min with the outlet still sealed.

22.110 Appliances for wall-mounting shall have reliable provision for fixing to a wall, independent of the connection to the water mains.

Compliance is checked by inspection.

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*

Flow switches are tested for 50 000 cycles of operation.

Pressure switches for open-outlet water heaters and pressure switches for appliances intended to supply water for showering only are tested for 20 000 cycles of operation. Pressure switches for other water heaters are tested for 50 000 cycles of operation.

24.1.4 *Addition*

Thermal cut-outs incorporated in closed water heaters shall comply with the requirements for type 2B controls in **13**, **15**, **16, 17** and **20** of IS/IEC 60730-1, unless they are tested with the appliance.

If a self-resetting thermal cut-out operates during the test of **22.107**, the number of cycles of operation is increased to,

a) 3 000, for waters heaters intended to supply water for showering only; and
b) 1 000, for other appliances.

24.101 The thermal cut-out or other protective device incorporated to comply with **22.106** shall be non-self resetting and provide phase disconnection.

Compliance is checked by inspection.

24.102 The thermal cut-out or other protective device, incorporated for compliance with **22.106** in closed water heaters having a capacity not exceeding 1 litre, shall maintain its operating characteristics.

Compliance is checked by the following test.

The appliance is supplied at rated voltage and operated under normal operation but with any control that operates during the test of **11** short-circuited. The water flow is adjusted so that the temperature of the water increases by approximately 1 K/min.

The thermal cut-out is caused to operate five times, the temperatures at which it operates are measured and the mean value determined. The thermal cut-out is subjected to 50 000 cycles of temperature fluctuation. Each cycle consists of a variation in temperature between the maximum value measured during the test of **22.107** and half this value.

The thermal cut-out is then caused to operate 20 times and the mean value of the temperatures at which it operates shall not deviate by more than 20 percent from the mean value previously determined.

If the protective device is sensitive to pressure, the appliance is not energized and is subjected to a slowly increasing water pressure. The mean operating pressure of the protective device is determined over five cycles. The protective device is subjected to 50 000 cycles of pressure fluctuation. Each cycle consists of a variation in pressure between the rated pressure of the appliance and half this value.

The protective device is then caused to operate 20 times and the mean value of the pressures at which it operates shall not deviate by more than 20 percent from the mean value previously determined.

25 SUPPLY CONNECTION AND EXTERNAL FLEXIBLE CORDS

This clause of Part 1 is applicable.

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

For Class I appliances, metal containers and other metal parts which are in contact with the water shall be permanently and reliably connected to the earthing terminal.

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.

30 RESISTANCE TO HEAT AND FIRE

This clause of Part 1 is applicable except as follows:

30.2.2 Not applicable.

30.2.3.1 Not 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 water heater 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)	Ref to Clause (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)	Screw 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 tests(s).

101.2 Acceptance Tests

The following shall constitute the acceptance tests:

Sl No. (1)	*Tests* (2)	*Ref to Clause* (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)	Moisture resistance	**15**
vi)	Leakage current and electric strength	**16**
vii)	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**).

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

101.3 Routine Test

The following shall constitute the routine tests:

Sl No.	*Tests*	*Ref to Clause*
(1)	(2)	(3)
i)	Protection against access to live parts	8
ii)	High voltage	**13.3.2** of IS 302-1
iii)	Provision for earthing	27

ANNEXES

The Annexes of Part 1 are applicable except as follows.

ANNEX A

(*Clause* 5.101)

ROUTINE TESTS

This Annex of Part 1 is applicable except as follows:

A-101 PRESSURE TEST

The water container is subjected to a pressure test using a fluid.

When a liquid is used, the pressure is,

a) for closed water heaters, 0.7 MPa for those having a rated pressure not greater than 0.6 MPa, and 1.1 times rated pressure for others; and

b) for open-outlet water heaters, 0.05 MPa.

When gas is used, these pressures may be reduced but are to be sufficient to reveal leakage.

NOTE — Care should be taken when testing closed water heaters with gas.

Leakage of the fluid is not to occur during the test.

(*Continued from second cover*)

Clauses/Tables which are additional to those of IS 302-1 are numbered starting from **101** and additional sub-clauses are numbered with the main clause number followed by **101**, **102**, etc, for example, **7.101**.

Apart from the changes brought about due to the revision of IS 302-1, the following major changes have taken place during this revision of this standard:

a) Modification in clauses relating to marking, abnormal operation test, components;
b) Water having temperature of 20 ± 5°C is used for the tests;
c) Water heater required to be IPX1;
d) Operation under overload condition of appliances with heating elements not to be carried out;
e) Requirement of maximum water temperature specified for appliances intended to supply water for showering only;
f) Minimum rated pressure specified for closed water heater; and
g) Pressure test requirement for water container for open outlet water heater added.

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

This standard is based on IEC 60335-2-35 : 2006, Edition 4.1 'Safety of household and similar electrical appliance — Part 2-35: Particular requirements for instantaneous water heaters' issued by the International Electrotechnical Commission except for the following modification:

a) Leakage current value is more stringent as compared to IEC Publication;
b) Ambient test conditions are based on national conditions; and
c) Bare-element water heater not included in this standard for safety reasons.

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.

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.

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 (5764).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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