IS 13395 (1995): Performance of Handles and Handle Assemblies Attached to Cookware [MTD 31: Utensils, Cutlery and Domestic Hardwares]

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IS 13395 : 1995
(Reaffirmed 2005)

भारतीय मानक

खाना पकाने के बर्तन में लगने वाले हत्थे और हत्था समुच्चय की कार्यकारिता — विशिष्टि

Indian Standard

PERFORMANCE OF HANDLES AND HANDLE ASSEMBLIES ATTACHED TO COOKWARE — SPECIFICATION

UDC 641.544.77 : 620.16

BUREAU OF INDIAN STANDARDS
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Price Group 5

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Utensils, Cutlery and Domestic Hardwares Sectional Committee had been approved by the Metallurgical Engineering Division Council.

This standard sets levels of performance for cookware for use on the top of a stove, or any other heating appliance by the accelerated simulation of hazards experienced in normal service. This standard is applicable to the handles and fixings of a wide range of cookware, such as saucepans, pressure cookers, frying pans and deep-fat fryers. In addition, certain requirements are extended to include the knobs which might be encountered on the lids, etc, of cookware.

The relationship between the diameter of an item of cookware and of the heat source upon which it is regularly used is critical to the service life of that item. The use of too small a pan or too large a heat source, either of which will allow heat to pass up the outside of the pan and play directly upon the handles and/or its fixing system, can severely affect the anticipated performance of an item. This relationship is only within the control of the ultimate user and attention is drawn to the need for this to be considered when selecting and using cookware, particularly on ring-radiant electric burners and with gas flame.

This standard is not intended to be suitable for certification purposes in its own right, but to serve as a reference standard to be called up in appropriate individual product standards or in cases of dispute.

A suggested sequence for testing cookware to the requirements of this standard is given in Annex G.

In the preparation of this standard, assistance has been derived from BS 6743 : 1987 'British standard specification for performance of handles and handle assemblies attached to cookware'.

In reporting the results of a test or analysis made in accordance with this standard, if final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'.

Indian Standard

PERFORMANCE OF HANDLES AND HANDLE ASSEMBLIES ATTACHED TO COOKWARE — SPECIFICATION

1 SCOPE

This standard specifies safety related performance requirements for the handles and knobs on items of cookware for use on the top of a stove, or any other heating appliance and includes the fixing systems used for attachment to the cookware. These requirements apply to all cookware, as defined, regardless of material of manufacture. The standard does not cover any other requirements for cookware and does not include items of ovenware specifically confined to use within the oven.

Handles, knobs and fixing systems are tested as complete items of cookware but individual components, suitably mounted, may be similarly evaluated for development purposes.

2 REFERENCES

The following Indian Standards are necessary adjuncts to this standard:

IS No.	*Title*
1068 : 1993	Electroplated coatings of nickel plus chromium and copper plus nickel plus chromium (*third revision*)
2347 : 1995	Domestic pressure cookers (*fourth revision*)
4955 : 1993	Household laundry detergent powders (*third revision*)

3 DEFINITIONS

For the purpose of this standard the following definitions shall apply.

3.1 Cookware

A utensil, in the form of a hollow container, intended for use in the preparation and/or cooking of food or beverages on the top of a stove, or any other heating appliance.

3.2 Cookware Body

That part of an item of cookware intended to retain the contents during use and including the base, side(s), lid and any movable or removable section(s).

3.3 Fixing System

The attachment method, or methods utilized in fastening a handle to the body of an item of cookware or to fix a knob to a lid or movable section.

3.4 Gross Capacity

The capacity in litres obtained when the cookware body is filled to the brim with water at room temperature and allowed to level off for one minute while standing on a level surface.

3.5 Handle

A projection affixed to the body of an item of cookware and intended to facilitate the carrying and handling of the article in normal use.

NOTE — A handle, or part of a handle, affixed to a lid is regarded as a knob.

3.6 Handle (or Knob) Assembly

The complete arrangement of a handle (or knob) and its fixing system as embodied in a finished, manufactured item of cookware or mounted onto a rigid support such that the position and fixing conditions in an actual item of cookware are exactly simulated.

3.7 Shallow Item

Articles of cookware of overall internal depth 75 mm or less, such as frying pans and saucepans.

4 CONSTRUCTION, MATERIALS AND USE

4.1 Construction

Handles and knobs shall be of such proportions that they can be held safely and with a secure grip. The provision of moulded finger grips and/or a textured, matt finish may be of assistance in providing secure gripping features.

Any exposed length of metal or flame guard between an insulated handle, if used, and the body of the cookware shall not exceed 25 mm for saucepans, etc, or 40 mm for shallow items when measured in the direction parallel to the axis of the handle.

4.2 Materials

All materials shall be finished smooth and free from burrs, splinters or sharp edges.

All plated metal surfaces shall conform to test laid down in IS 1068 : 1993 for Service Grade No. 2.

NOTE — All materials used for the construction of cookware should comply with the requirements of the appropriate statutory instruments relating to usage and/or material, if the cookware, is to be used for the preparation of food or beverage and the material is liable to come into contact with the contents.

4.3 Selection and Size

The type and minimum number of handles to be used on cookware of a given gross capacity shall be in accordance with Table 1.

Table 1 Selection Criteria

Size of Cookware — Gross Capacity, litre	Number and Type of Handle(s)
(1)	(2)
1 to 2	1 straight
2 to 5	1 straight or 2 loop/flange
5 to 10	1 straight and 1 loop/flange or 2 loop/flange or single handle, provided that this enables both hands to be used
10 and above	1 straight and 1 loop/flange or 2 loop/flange

Where an item of cookware has a single straight handle only this shall be not less than 150 mm in length when measured along its top surface from the point of contact with the cookware and including any flame guard. Loop or flange handles shall be not less than 50 mm in the dimension adjoining the circumference of the body of the cookware.

NOTE — Knobs should be of such dimensions that, in normal use, the hand cannot readily contact the material of the cookware. The provision of an extended ring of material at the base of a knob to act as a finger guard can be advantageous in this respect.

4.4 Position with Respect to Cookware

Handles shall be positioned above the centre of gravity of the cookware when filled to its gross capacity. For shallow items there shall be a minimum clearance of 30 mm between the handles and the horizontal projection of the base of the cookware at the point 0.33 times the length as shown in Fig. 4(a).

The mass of a handle shall be such that the cookware is stable when placed empty, and without any lid, on a level surface.

Knobs shall be positioned so as to provide ease of movement and/or maximum stability to any removable section or lid during and after its removal. It shall not be possible to contact a heated surface of the cookware in using the knob for its normal purpose.

4.5 Attachment to Cookware

Attachment shall be by rivetting, welding and/or threaded fixing for handles and knobs not integral with the body of the cookware. A symmetrical knobs shall be fixed at two points.

Welded stud fixing shall be capable of withstanding an applied torque of 11 N.m per stud for handle attachment and 4 N.m per stud for knob attachment without visible distortion of the stud or weld.

Threaded fixing shall incorporate a locking washer or similar device like suitable thread locking/sealing adhesive to hold them secure.

Attachment of handles and knobs to cookware shall be firm and close, presenting no traps for dirt within the cookware where contact with food could be made in normal use.

It shall not be possible to touch, from the exterior of the cookware body with a spherical probe of diameter 14 mm, any part of a metal fixing system in the holding zone of the handle directly attached to, or penetrating, the cookware body which may reach a temperature exceeding 50°C in normal use.

5 PERFORMANCE

5.1 General

The requirements specified in this clause are intended to be applied to complete items of cookware, incorporating the handle and its fixing system, as produced for sale.

Permanent deformation of, or failure in, the body of the cookware adjacent to a handle in a performance test shall be regarded as failure to satisfy the related requirement.

Handle assemblies, or knob assemblies, shall satisfy each of the appropriate requirements specified in **5.2** to **5.10**. A handle, or part of a handle, affixed to a lid shall satisfy only those requirements appropriate to knob assemblies.

NOTES

1 It is possible for a minimum number of samples to be taken through all of the tests in a programmed sequence but it is not a requirement of this standard that samples should pass all of the tests sequentially and failure at any point in a sequential series of tests may be overruled by the satisfactory performance of new samples. A suggested sequence for testing cookware to the requirements of this standard is given in Annex G.

For the purpose of proof testing or quality control of handles, knobs or handle assemblies or knob assemblies the requirements and tests specified shall be applied to handles, knobs and/or fixing systems suitably mounted to simulate their use in actual cookware but in making recommendations based on the results of such evaluations, the selection and size requirements given in **4.3** shall be adhered to.

2 For materials not known to be impact sensitive it is desirable that the performance tests of Annexes A to D should induce, at their end-point, a gradual, or ductile, failure rather than a sudden or brittle one.

5.2 Bending Strength

A handle assembly shall withstand a bending force of 75 N when tested as described in Annex A, without visible failure of, or damage to, any part thereof and without permanent distortion or permanent loosening of the fixing system.

5.3 Torque Strength

A handle assembly shall withstand a torque of 5 N.m and a knob assembly a torque of 3 N.m when tested as described in Annex B, without visible failure of, or damage to, any part thereof and without permanent distortion or permanent loosening of the fixing system.

5.4 Impact Strength

A handle assembly shall withstand an impact mass equal to one half of the mass of the empty item of cookware or 500 g, whichever is less subject to a minimum mass of 250 g, and a knob assembly, an impact mass of 250 g when tested as described in Annex C, without visible failure of, or damage to, any part thereof and without permanent distortion or permanent loosening of the fixing system.

5.5 Fatigue Resistance

A handle assembly shall withstand 1 500 raising and lowering cycles without permanent distortion or permanent loosening of the handle or of its fixing system when tested as described in Annex D.

5.6 Leakage

There shall be no leakage of the content of the cookware through any fixing system penetrating the body of the cookware during the performance of the test described in Annex E.

This test shall be carried out before and after the tests described in Annexes A to D.

For a pressure cooker, the test for leakage shall be a proof pressure test performed in accordance with IS 2347 : 1987. This test shall be carried out after the tests described in Annexes A to D.

5.7 Thermal Insulation

The maximum temperature rise above ambient of a handle material or knob material to be contacted by the hand in normal use shall not exceed the following, as appropriate, when tested as described in Annex E:

a) Plastics, wood, rubber : 50°C

b) Glass, porcelain, vitreous material : 40°C

c) Metal : Either 30°C, or where this is exceeded, the cookware shall carry a warning that in use the handle must be insulated, for example by the use of an oven glove.

5.8 Heat Resistance

A handle assembly or knob assembly shall continue to meet the appropriate requirements of **5.2** to **5.5** following:

a) for thermosetting plastics materials, heating in an air circulating oven at 180 ± 2°C for 1h and cooling at ambient temperature for 3 h;

b) for all other materials, heating in an air circulating oven at 100 ± 2°C for 168 h and cooling at ambient temperature for 3 h.

NOTE — However blisters appearing on plastic handles, will not constitute failure under this test.

5.9 Washing Resistance

A handle assembly or knob assembly shall continue to meet the appropriate requirements of **5.2** to **5.5** following either:

a) 100 wash and dry cycles, simulating hand washing, of immersion in a 2 percent *V/V* solution of mestic washing-up liquid (*see* IS 4955 : 1993), for 6 ± 1 min at 60 ± 5°C, followed by drying suspended in air at room temperature for 6 ± 1 min;

b) 25 cycles in a domestic dishwashing machine, operating at 70 ± 5°C, with a 35 g charge of detergent approximately to the following analysis:

32 percent sodium triolyphosphate	(anhydrous)
25 percent sodium carbonate	(anhydrous)
35 percent sodium metasilicate	(anhydrous)
5 percent calcium hypochlorite	(anhydrous)
Remainder surfactant	(anionic type)
Caustic alkalinity = 15 percent as NaO	(sodium oxide)

The test temperature shall be that measured on the article under test during the hot washing part of the cycle. Allow the article under test to rest for not less than 1 h at ambient conditions between each cycle.

5.10 Burning Resistance

A handle shall not melt or drip molten and/or burning material with the applied flame in either position when tested as described in Annex F. Any burning shall either extinguish itself within 15 s of removal of the flame, or if burning continues beyond 15 s, it shall be extinguished by a steady drought of 5 m/s applied across the area of burning. Once extinguished the handle material shall not spontaneously re-ignite.

With the test flame applied at the body/handle junction there shall be no loosening or distortion of the handle attachment during or after the test.

Following the application of the flame to both positions and cooling for 3 h, a handle assembly shall continue to satisfy the requirements given in **5.4** and the first paragraph of **5.6**.

ANNEX A

(*Clause* 5.2)

BENDING STRENGTH TEST

A-1 APPARATUS

A-1.1 A means of applying a force of 75 N at a speed not exceeding 50 mm/min.

NOTE — A tensile testing machine is an appropriate means of achieving this.

A-1.2 A D section loading bar, diameter 10 ± 1 mm, to transmit the applied force evenly across the width of a handle under test.

A-1.3 A means of attaching the cookware firmly to a rigid base throughout the test, for example, a G clamp, or for attaching a handle via its fixing system to an appropriate support.

A-2 PROCEDURE

A-2.1 Attach the cookware firmly to the rigid base so that the contacting face of the loading bar is 10 ± 1 mm from the end of the handle (*see* Fig. 1).

A-2.2 Apply the loading bar at a speed not exceeding 50 mm/min until a force of 75 N is applied or until failure of the assembly occurs, whichever is the sooner.

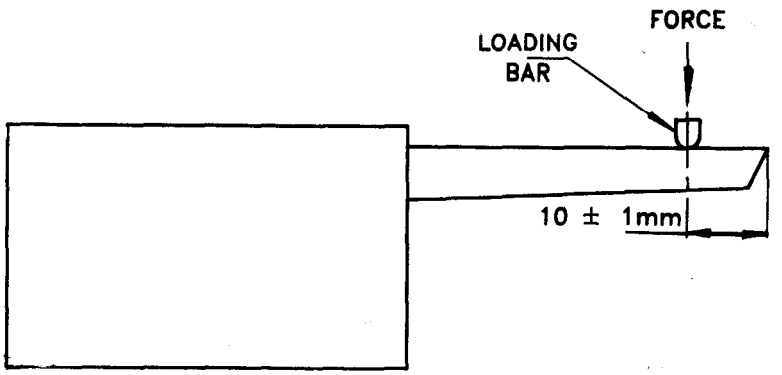


FIG. 1 ARRANGEMENT FOR BENDING STRENGTH TEST

ANNEX B

(*Clause* 5.3)

TORQUE TEST

B-1 APPARATUS

B-1.1 A calibrated torque wrench capable of applying a torque of up to 5 N.m.

B-1.2 A means of attaching the cookware firmly to a rigid base throughout the test, for example, a G clamp, or for attaching a handle or knob via its fixing system to an appropriate support.

B-2 PROCEDURE

B-2.1 Attach the cookware firmly to the rigid base and clamp the torque wrench to the handle or knob adjacent to the fixing system at 90° to the major axis of the fixing system.

B-2.2 By means of the wrench twist the handle or knob until a torque of 5 N.m for a handle or 3 N.m for a knob is applied or until failure of any part of the assembly occurs, whichever is the sooner.

ANNEX C
(*Clause* 5.4)

IMPACT STRENGTH TEST

C-1 APPARATUS

C-1.1 A means of dropping a weighted striker from a height of 500 ± 5 mm so that it falls vertically, essentially without friction, using guides.

C-1.2 A steel striker of hemispherical striking surface 25 ± 1 mm in diameter and mass 250 ± 5 g capable of being weighted to a total mass of 500 ± 5 g.

C-1.3 A means of attaching the cookware firmly to a rigid base throughout the test, for example, a G clamp, or for attaching a handle or knob via its fixing system to an appropriate support and arranged such that the cookware may also be turned through 90° and 180° so that the handle or knob may additionally be struck on its side and, if appropriate, on its lower surface.

C-2 PROCEDURE

C-2.1 Attach the cookware or the lid firmly to the rigid base so that it is correctly aligned below the striker. Support the underside of a lid when striking the knob directly.

C-2.2 Load the striker to the appropriate mass (one half of the mass of the empty cookware of 500 g, whichever is less for a handle, 250 g for knob or for the handle of cookware of mass less than 500 g) and release it so that it strikes the handle within 10 mm of its end (*see* Fig. 2) or the knob directly.

C-2.3 Inspect the assembly and report any visible damage.

C-2.4 Rotate the assembly through 90° so as to strike the handle or knob on one side.

C-2.5 Repeat the procedures described in **C-2.2** and **C-2.3**.

C-2.6 Rotate the assembly through a further 90° so as to strike the handle or knob (if appropriate) on its underside.

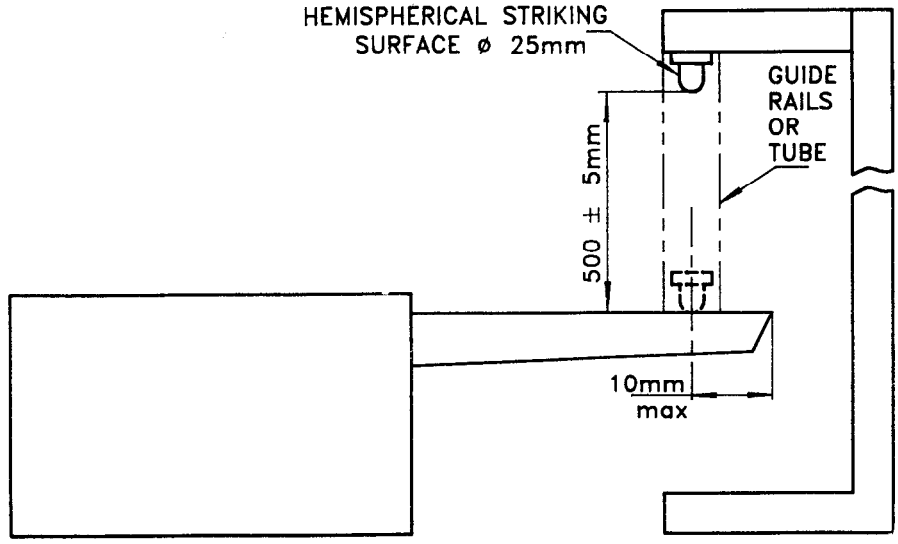


FIG. 2 ARRANGEMENT FOR IMPACT TEST

ANNEX D

(*Clause* 5.5)

FATIGUE TEST

D-1 APPARATUS

D-1.1 A means of continuously raising the lowering a loaded item of cookware from a level surface once per minute by means of its handle. The general form of a suitable apparatus is shown in Fig. 3, the profile of the cam providing the raising and lowering action is such that a smooth graduation from rest to the fully raised position (40 ± 2 mm) and back to rest is achieved in 60 ± 1 s.

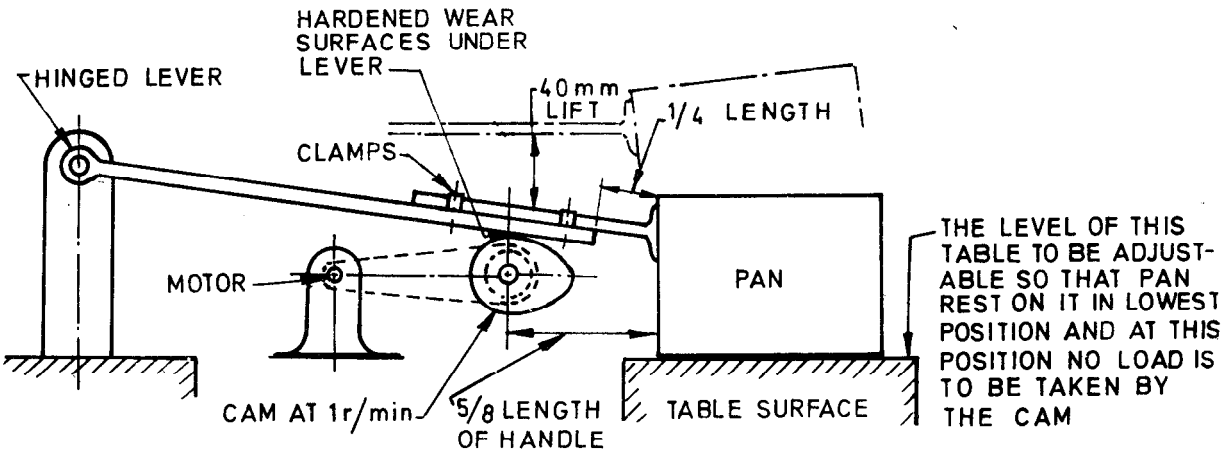
D-1.2 Metal spheres 40 ± 10 mm in diameter, as loading for the cookware during the test.

D-2 PROCEDURE

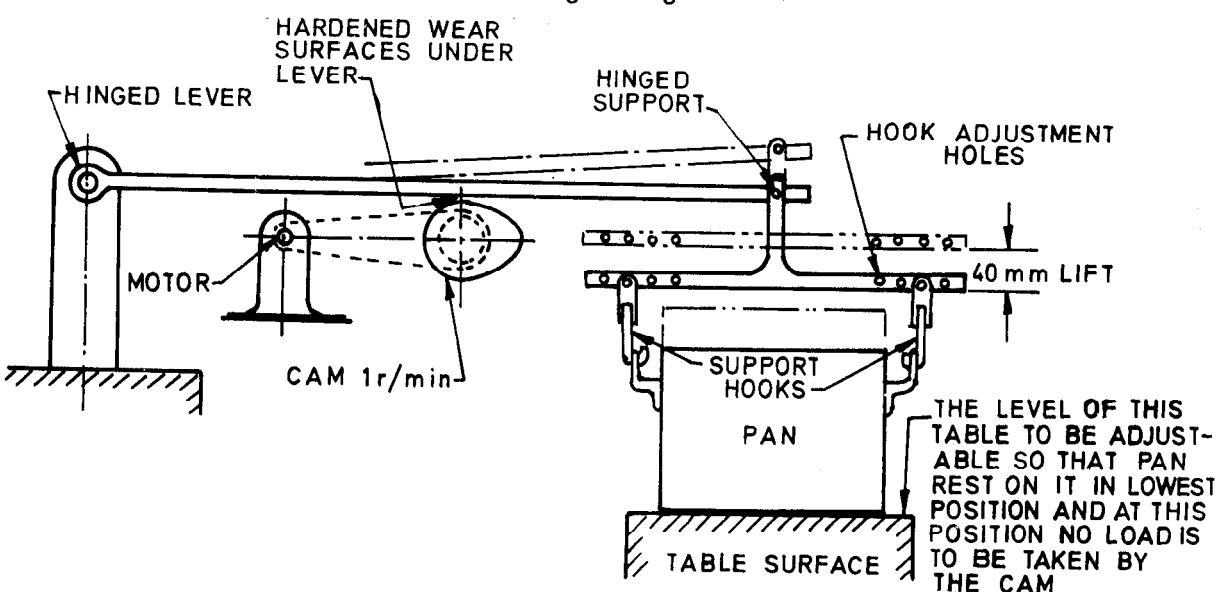
D-2.1 Place into the cookware a loading of metal spheres of mass equivalent to 2.25 times the mass of water at the gross capacity of the cookware.

D-2.2 Attach the cookware securely to the apparatus as shown in Fig. 3A, 3B or 3C, as appropriate and raise and lower it once per minute by means of the rotating cam. The selection of apparatus is made according to the number and type of handle(s) specified in **4.3** irrespective of the number and type of handle(s) actually fitted.

D-2.3 At the completion of 1 500 raising and lowering cycles, examine the cookware and report any permanent visible distortion or weakening of any part of the handle assembly or assemblies.

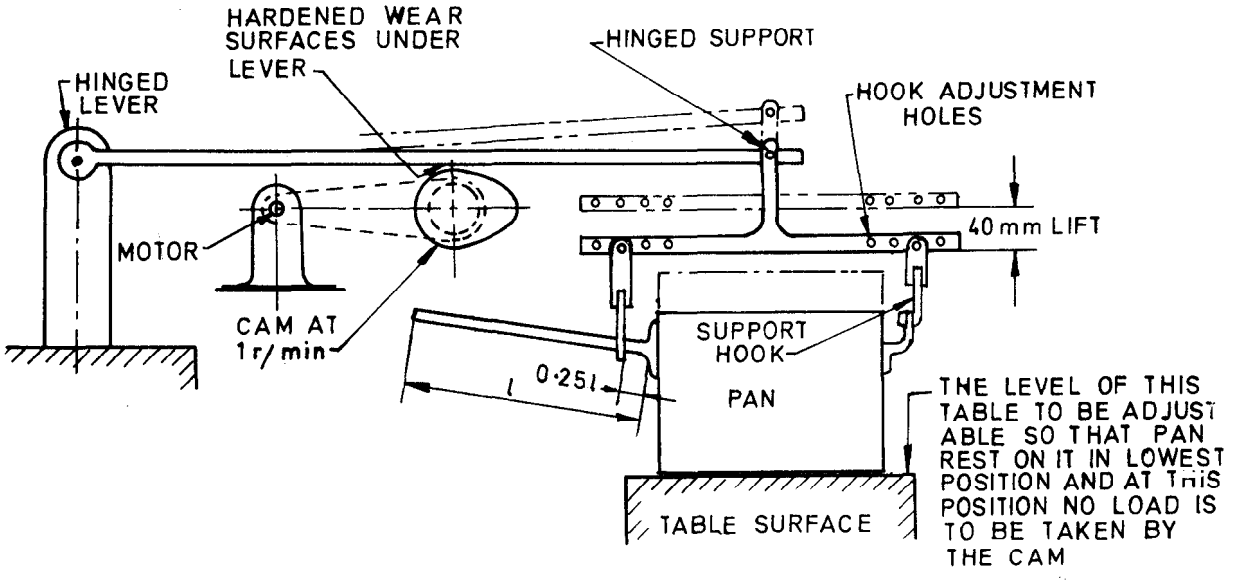


3A For a Single Straight Handle



3B For Two Loop, Flange or Similar Handles

FIG. 3 ARRANGEMENTS FOR FATIGUE TESTS — *Contd*



3C For One Straight Handle and One Loop, Flange or Similar Handle

FIG. 3 ARRANGEMENTS FOR FATIGUE TESTS

ANNEX E

(*Clauses* 5.6 *and* 5.7)

LEAKAGE AND THERMAL INSULATION TEST

E-1 APPARATUS MATERIALS AND CONDITIONS

E-1.1 Gas ring or hot plate rated at 3 kW in still air and of sufficient size to heat the whole area of the base of the cookware under test without extending beyond this in the area below the handle.

E-1.2 Thermocouple,or any other temperature measuring device accurate to ± 3°C over the range 30°C to 100°C and consisting of a surface contact probe capable of being held in intimate contact with a handle or knob.

NOTE—Temperatures are measured on the underside of a handle and half way up at the sides of a knob or a handle fixed to a lid.

E-1.3 Water of no special degree of purity and cooking oil of flash point in excess of 250°C.

E-1.4 The tests are carried out in draught free conditions at room temperature.

The actual room temperature at the time of the measurements required by **E-2.1.3**, **E-2.2.3** or **E-2.3.3** is recorded to an accuracy of ± 3°C to enable calculation of the temperature rise above room temperature (*see* **5.7**).

E-2 PROCEDURE

E-2.1 Cookware in which cooking oil is not normally intended to be used, other than pressure cookers (*see* **E-2.3**).

E-2.1.1 Fill the cookware with cold water to above the level of the main handle connection(s) and attach the lid, if any.

E-2.1.2 Raise the temperature of the water to boiling point and maintain at a constant, moderate rate of ebullition.

E-2.1.3 By means of the thermocouple or any other temperature measuring device, measure the temperatures reached at each of the points specified in Fig. 4A to 4D, as appropriate and record these after 30 minutes ebullition.

E-2.1.4 During the test observe and record whether there is leakage through any fixing penetrating the body of the cookware.

E-2.2 Cookware in Which Cooking Oil is Intended to be Used

E-2.2.1 Fill the cookware with cooking oil to 50 percent of gross capacity for shallow items or 90 percent of gross capacity for other items.

NOTE — For reasons of safety, it is essential that this test be carried out without any lid or cover on the cookware unless the product under evaluation is expressly intended to be covered.

E-2.2.2 Raise the temperature of the cooling oil to:

a) 220 ± 5°C for shallow items of cookware; and
b) 180 ± 5°C, for other items of cookware.

Maintain the cooking oil at the appropriate temperature.

E-2.2.3 By means of the thermocouple measure the temperature reached at each of the point specified in Fig. 4A to 4D as appropriate and record these after 15 minutes at the appropriate temperature.

E-2.2.4 During the test observe and record whether there is leakage through any fixing penetrating the body of the cookware.

WARNING NOTE — Due care should be exercised when conducting this test with cooking oil. The temperatures specified are close to the flash point of the oil and adequate ventilation is essential.

E-2.2.5 If the level of oil in the test does not come above the level of the main handle connections, carry out test described in **E-2.1** omitting the temperature measurements of **E-2.1.3**.

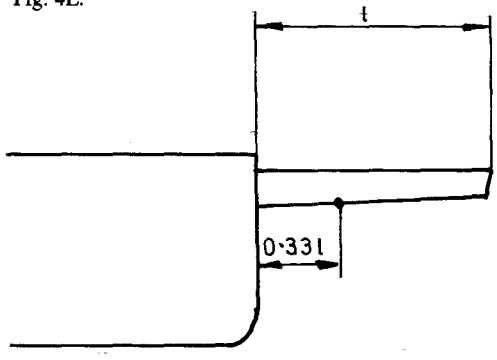
E-2.3 Pressure Cookers

E-2.3.1 Fill the pressure cooker to one half of its gross capacity with cold water and attach the lid in accordance with the manufacturer's instructions.

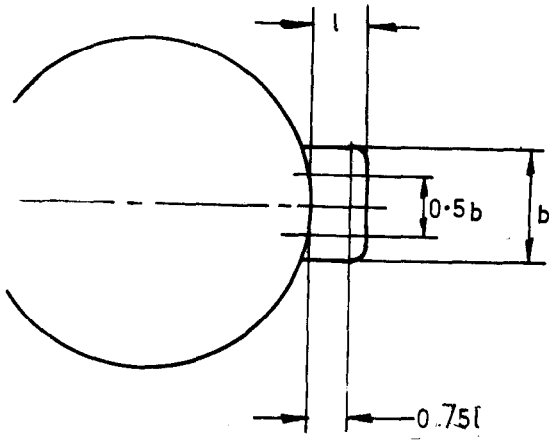
E-2.3.2 Raise the temperature of the water to the nominal operating pressure of the cooker and maintain it steadily at the nominal operating pressure with the burner adjusted to the minimum setting required to achieve this.

E-2.3.3 By means of the thermocouple measure the temperature reached at each of the points specified in Fig. 4A to 4E as appropriate and record these after 10 minutes of steady operating at the nominal operating pressure.

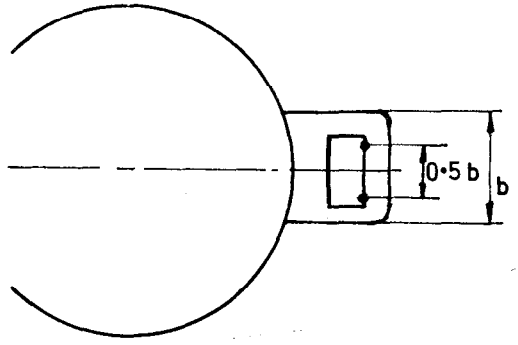
NOTE — A handle, or part of a handle, affixed to the lid of a pressure cooker is measured at the point specified in Fig. 4E.



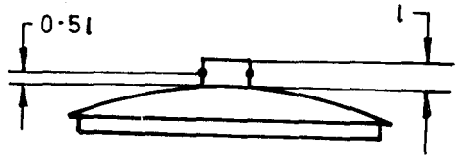
4A Long Handle



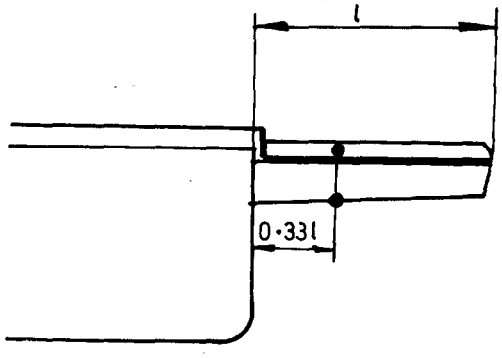
4B Solid Flange Handle



4C Loop Handle



4D Knob



4E Pressure Cooker Handle(s)

All dimensions in millimetres.

FIG. 4 POINTS FOR TEMPERATURE MEASUREMENT

ANNEX F
(*Clause* 5.10)

RESISTANCE TO BURNING

F-1 APPARATUS

F-1.1 A burden burner, tube diameter 9.5 ± 0.5 mm fuelled by natural gas and adjusted to a flame height of 38 ± 2 mm with the air inlet to the burner closed.

F-1.2 A means of attaching the cookware firmly to a rigid base throughout the test for example, a G clamp, or for attaching a handle or knob via its fixing system to an appropriate support.

F-1.3 A draught free area provided with a facility for the extraction of any fumes immediately following the test.

F-2 PROCEDURE

F-2.1 Attach the cookware to the rigid base.

F-2.2 Position the burner (alight) so that the centre of the burner tip is 18 ± 2 mm below the bottom surface of the end of the handle (*see* Fig. 5).

F-2.3 Expose the handle to the flame for 30 ± 1 s, remove the flame, and allow the handle to burn either until any flame extinguishes or for 15 s whichever occurs first. Observe whether molten or burning material falls from the handle during this period.

F-2.4 Measure the record the length of any time for which the handle continues to burn following removal of the flame. If this reaches 15 s, immediately apply a steady draught of 5 m/s across the area of burning for 5 s and record whether burning continues or is extinguished.

F-2.5 Reposition the burned under the handle, ignoring any flame guard, as close as practicable to the body/handle junction and repeat the procedures described in **F-2.2** to **F-2.4.**

F-2.6 Allow the cookware to cool for 3 h at ambient temperature and then carry out the appropriate tests described in Annexes C and E (*see* **4.10**).

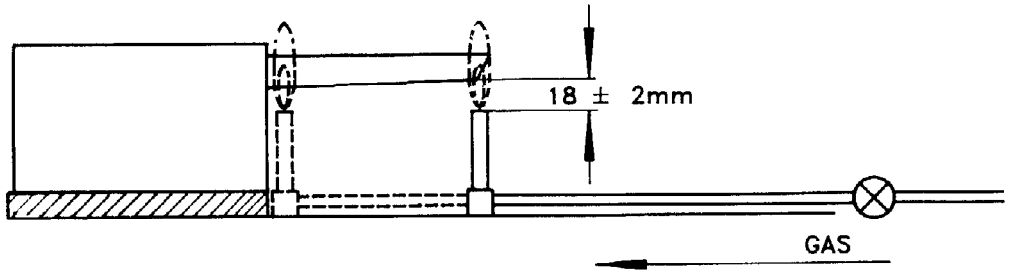
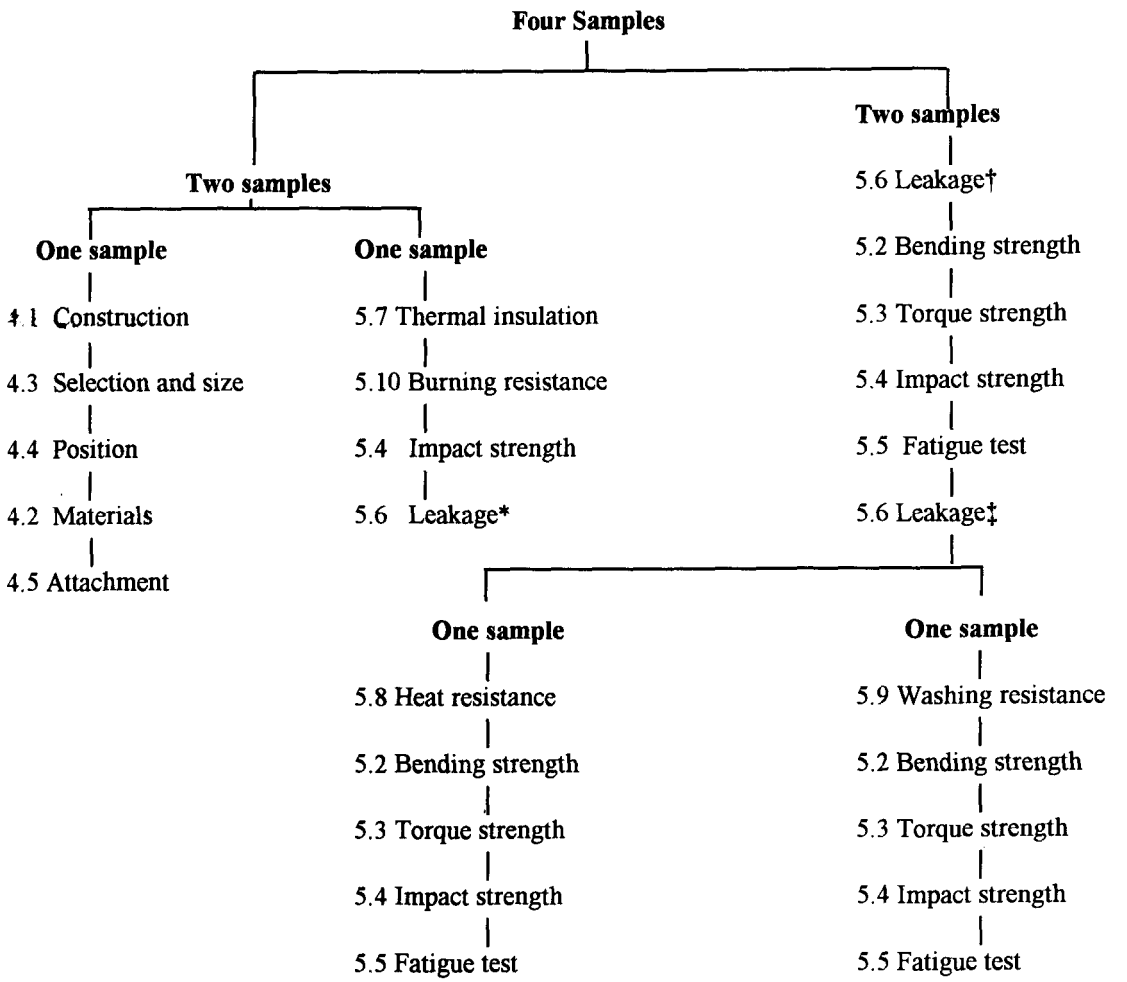


FIG. 5 ARRANGEMENT FOR BURNING TEST

ANNEX G
(Foreword)

TESTING SEQUENCE

A suggested sequence for testing cookware to the requirements of this standard is shown below:



* *See* 5.6 paragraph 1.
† *See* 5.6 paragraph 2.
‡ *See* 5.6 paragraph 3.

Bureau of Indian Standards

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Review of Indian Standards

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