

BUREAU OF INDIAN STANDARDS

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भारतीय मानक मसौदा

द्रवित पेट्रोलियम गैस के साथ प्रयुक्त घरेलू गैस चुल्हे – विशिष्टि

(आई एस 17153 का पहला पुनरीक्षण)

Draft Indian Standard

**DOMESTIC GAS STOVES AND BUILT IN HOB FOR USE
WITH PNG — SPECIFICATION**

(First Revision of IS 17153)

ICS 75.160.30, 97.040.20

Domestic and Commercial Gas Burning Appliances Sectional Committee, MED 23	Last date for receipt of comments is 17 August 2024
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FOREWORD

(Formal clause to be added later)

This standard is one of a series of Indian standards on various domestic and commercial gas burning appliances (Present type) used with piped Natural gas (PNG). General requirements of this equipment are covered in IS 5116: 2022. General requirements of Domestic and commercial equipment for use with LPG, which is a necessary adjunct to this standard should however, any deviation exist between the requirements given in IS 5116: 2022 and those of this standard, provisions of the latter shall apply. Other standard in this series is IS 17150: 2019 ‘Mini domestic water heater for use with PNG Piped Natural Gas–Specification’.

This standard was first published in 2019. The present revision has been brought out with a view to incorporate the modifications found necessary as a result of experience gained on the use of this standard. Also, in this revision, the standard has been brought into the latest style and format of Indian Standard, and references to Indian Standards, wherever applicable have been updated.

The major changes in the standard has been listed below:

- The scope of the standard has been enlarged to cover, metallic or plastic frame with glass top;
- Provisions of Built-In Hobs have been incorporated in this standard;
- Amendments issued from time to time has been incorporated;
- Provisions of thermal shock test has been modified;
- New provision for design of pan support has been added;

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- f) Clause 14, Gas Inlet connections has been modified; and
- g) New provisions for gas rate at STP have been added in table 1.

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 : 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be same as that of the specified value in this standard.

Draft Indian Standard

**DOMESTIC GAS STOVES AND BUILT IN HOB FOR USE
WITH PNG — SPECIFICATION**

(First Revision of IS 17153)

1 SCOPE

1.1 This standard specifies construction, operation, safety requirements and tests for domestic gas stoves with corrosion resistant or non-corrosive metallic bodies, corrosion resistant or non-corrosive metallic or plastic frame with glass top and Built in hobs intended for use with Natural gas at 21 mbar (21.41 gf/cm²) gas inlet pressure.

1.1.1 For convenience, this standard has been divided into three sections as follows:

Section 1 Construction

Section 2 Performance

Section 3 General

NOTE — For calculation 1 Kcal/hr = 1.16278 Watt

2 REFERENCES

The standards listed in Annex A contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed in Annex A.

3 TERMINOLOGY

For the purpose of this standard, definitions given in IS 6480 shall apply.

SECTION 1 CONSTRUCTION

4 GENERAL

4.1 In addition to the relevant requirements given in 4 of IS 5116, the requirement given in **4.1.1** shall also apply.

4.1.1 No pressure regulator shall be included as a part of the stove.

5 MATERIALS

5.1 Fittings and materials shall comply where specified with the relevant Indian Standard and shall be appropriate with the conditions arising in the part of the appliance in which they are used. The appliance shall be free from swarf, grit and other foreign matters. Wherever practicable rigid metal tubing shall be used for internal gas supplies integral with the appliance. If flexible tubing is used,

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it shall not be fitted on the outlet side of any control which is capable of cutting off the gas completely, except where screwed metal connections are fitted. The use of low pressure rubber or plastic tubing fitted or pushed on nozzle is not recommended.

5.1.1 Plastic components which are liable to heating (for example, tap handles push buttons, etc) shall be free of fissures, distortion, blemishes and discoloration and shall not show signs of ageing when tested as given in Annex B of IS 5116.

NOTE — Read PNG in place of LPG in IS 5116.

5.2 The material used in the construction of the appliance or parts of the appliance shall be resistant to wear and deterioration occurring in the normal use. The burner parts shall not melt or distort when the burner is operated with flames flashed back for half an hour in the mixing tube. This shall be checked by the test detailed in Annex C of IS 5116.

5.3 All copper and copper alloy parts shall pass the mercurous nitrate test (season cracking test) when tested according to the method specified in IS 2305.

5.4 The main body of the burner (including mixer head, mixing tube and burner head) shall be of substantial and durable construction. Metals having a melting point below 510°C shall not be considered acceptable for top burners while metals having a melting point below 800°C shall not be considered for oven griller or auxiliary burner or any other combination thereof.

5.5 The components of the gas taps may be made of the following materials. Examples of suitable materials specified below are for guidance:

Alloy LM 6, LM 20	Bodies — Alloy 4600 and Alloy 4600 A of IS 617.
Alloy DCB 1	Bodies (Die castings) — DCB 1 of IS 1264.
Alloy DCB 3	Bodies (pressure Die castings) — DCB 2 of IS 1264.
Alloy CZ 122	Bodies, Plugs & Nuts, etc — Type 1 of IS 319.
Alloy CZ 121	Bodies, Plugs & Nuts, etc — Type 1 of IS 319.
Alloy En 56 series	Springs (Stainless steel) — Grade 1 of IS 4454 (Part 4)
Alloy C 160, C 107	Tubes — Grade DHP and DPA of IS 2501.
Alloy CZ 108	Washers — Alloy CuZn37 of IS 410.

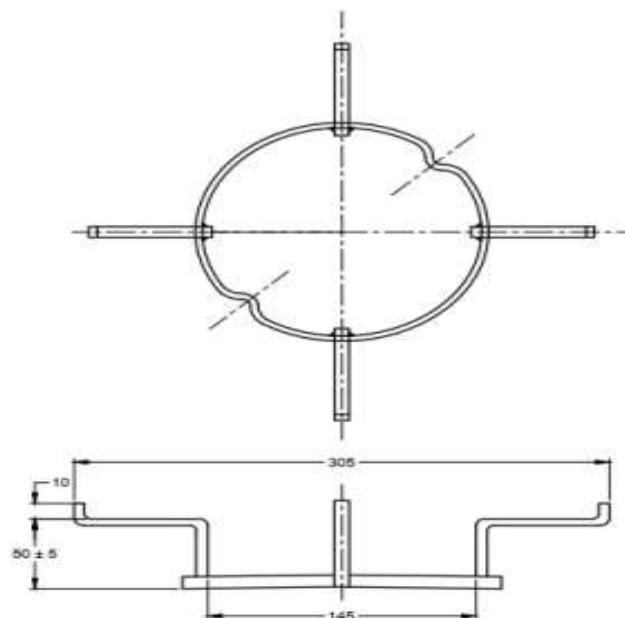
5.6 Drip trays, if provided, shall be made of non-corrosive material or appropriately finished and treated to resist corrosion.

5.7 Surface of Glass or Glass Ceramic

5.7.1 Toughened glass, if provided, shall meet the following requirements –

- Compliance as per IS 2553 (Part 1).
- The thickness of the glass shall be minimum 5.7 mm.
- Toughened glass top including their edges or corners shall not have fissures or scratches.
- The toughened glass should withstand thermal shock when tested as per Annex C.
- An adhesive tape of minimum thickness as 0.10 mm, shall be pasted on toughened glass with no visible wrinkles; The adhesive tape shall not burn or peel off;

- f) The following instructions for safe use of glass top gas stove shall be printed on the toughened glass. The instructions shall be properly readable. Instructions shall also be printed in the instruction manual provided;
- 1) Bati/tandoor/inverted vessel or similar utensils shall be used only with bati stand provided with the glass top gas stove;
 - 2) Do not pour water on the glass when it is hot;
 - 3) Do not keep hot vessels on the glass surface;
 - 4) Do not hammer the glass
- g) The means used to hold the glass top of the gas stove shall not allow any stress or risk of mechanical change to the glass top. For example, screws used for assembly shall not come into contact with glass top.
- h) The distance between flat bottom of vessel and glass top shall be such that the temperature of the glass does not exceed 200 °C when tested with Vessels having diameter suitable to cover the pan supports duly filled with water and placed on all the burners of the appliances. The taps of the burners shall be turned on and gas shall be allowed to flow through the burners at full rate for a duration of 30 minutes; and
- j) A Bati stand shall be provided as part of toughened glass gas stove for making Bati, Tandoor or inverted vessel preparation etc. The design of the Bati stand shall be such that, it meets with the requirement of 5.7.1 (h) above. The design referred as Fig. 1 is only for reference. Any other design may be used, provided the condition of temperature of glass given above is satisfied.



All dimensions in millimeters.

FIG. 1 REFERENCE FIGURE FOR BATI/INVERTED VESSEL/TANDOOR STAND

6 DESIGN FOR MAINTENANCE

6.1 The appliance, including all the component parts, shall be easy access to the accessories and controls for maintenance and adjustment.

6.2 The parts of the burner shall not become disconnected during operation of the appliance. The burners should be so spaced that the relative distance between the centers of the adjoining burner shall not be less than 180 mm.

6.3 Burner ports shall be so designed and located that in normal use spillage of food shall not cause internal fouling of mixing tube and/or blockage of injector jet.

6.4 Burners and parts of burners only of same rating model and make, shall be interchangeable or replaceable without effecting performance.

6.5 Parts, which are intended to be removable by the user, shall be easy to replace correctly, and difficult to assemble incorrectly.

6.6 All nuts, bolts and fittings having spanner flats shall be capable of being moved by suitable spanner or be readily accessible to an adjustable spanner.

6.7 Auto ignition system operating on electricity should meet with the requirement of **6.7** of IS 5116. This requirement will not be applicable for battery operated auto ignition.

6.8 Sheet thickness of the body/channel frame shall be 0.5 mm minimum.

7 RIGIDITY AND STABILITY

The appliance shall be so designed that it remains stable and shall not be easily overturned.

7.1 The appliance shall be so designed that it remains stable and shall not be easily overturned.

7.2 The appliance, if mounted on a cylinder or on a stand shall be so designed that it will not tip over when placed on a plane at an angle of 10° from the horizontal, with the container empty.

7.3 For cooking appliances, the design of the pan support shall be such that the assembly will remain stable when used with vessel of diameter from 150 mm to 250 mm.'

8 WORKMANSHIP AND FINISH

8.1 The finish of exposed parts shall be durable, easy to clean and not subject to excessive deterioration in normal use. Parts, which will come in contact with the foodstuff, shall be capable of being hygienically cleaned. The finishes shall, on visual examination, show no defects, such as pin-holes, blisters, roughness or exposed areas of metal, which give rise to unduly rapid deterioration in use. The finished components shall meet the requirements covered in **8.2** to **8.4**.

8.2 Vitreous enameled components shall meet the requirements as given in Annex E of IS 5116. The test shall be carried out on a specimen measuring 40 mm × 75 mm prepared from the same

base metal and enamels, as the components, and fired along with the components to ensure identical conditions.

8.2.1 A separate specimen shall be used for each test.

8.3 If the body of the stove is electroplated, the top flat surface shall have a coating of a minimum of 10 microns of nickel followed by 0.2 micron of minimum chromium. The coating shall be tested as per the requirements given in **8.3.1** and **8.3.2**.

8.3.1 The thickness of nickel plating shall be determined by BNF jet method or any other method, such as coulometric method as specified in IS 3203.

8.3.2 Adhesion Test

Cut a piece of a plated article. Hold it in a vice and apply a coarse filed to the cut edges in such a manner as to raise the deposit. There shall be no separation between the coating and the Basis metal and the coating shall continue to adhere to the base metal.

8.4 Paints or Similar Finishes for Gas Stove Body

Surfaces finished in stoving paints or similar material shall conform to the following requirements:

- a) Resistance to Abrasion — Painted surface shall be tested for resistance to scratching as described below:

The apparatus required for this test shall be as per Fig. 1 with a 1 mm diameter steel ball fixed at the end of the counterpoised arm which is kept horizontal.

- 1) Method of test — Apply the apparatus to the surface under test and move the ball after loading with not less than 1.5 kg at 3 to 4 cm/s relative to the surface. If the indicator bulb lights, the surface is deemed to have been penetrated. For metallic paints, a visual examination of the scratch is necessary in order to determine whether the film has been penetrated. The finish is deemed to have failed if the scratch has jagged edges, is greater than 1 mm width or penetrates the film. Clean the ball after each test and inspect frequently to verify that it is 1 mm sphere.
- b) Resistance to Heating — When the appliance is operated at its normal working pressure for a continuous period of 8 h with a pan filled with water placed on the burner, there shall be no appreciable change of color of any part of the stove and the finish shall not become tacky or show other signs of deterioration. This does not apply to parts, which come into direct contact with the flame. After the initial burning off period, there shall be no detachable odour from the flame when the stove is operated normally.

NOTE — Alternatively the body of the stove can be kept in an oven maintained at $80 \pm 5^\circ\text{C}$ for 8 h for checking the conformity

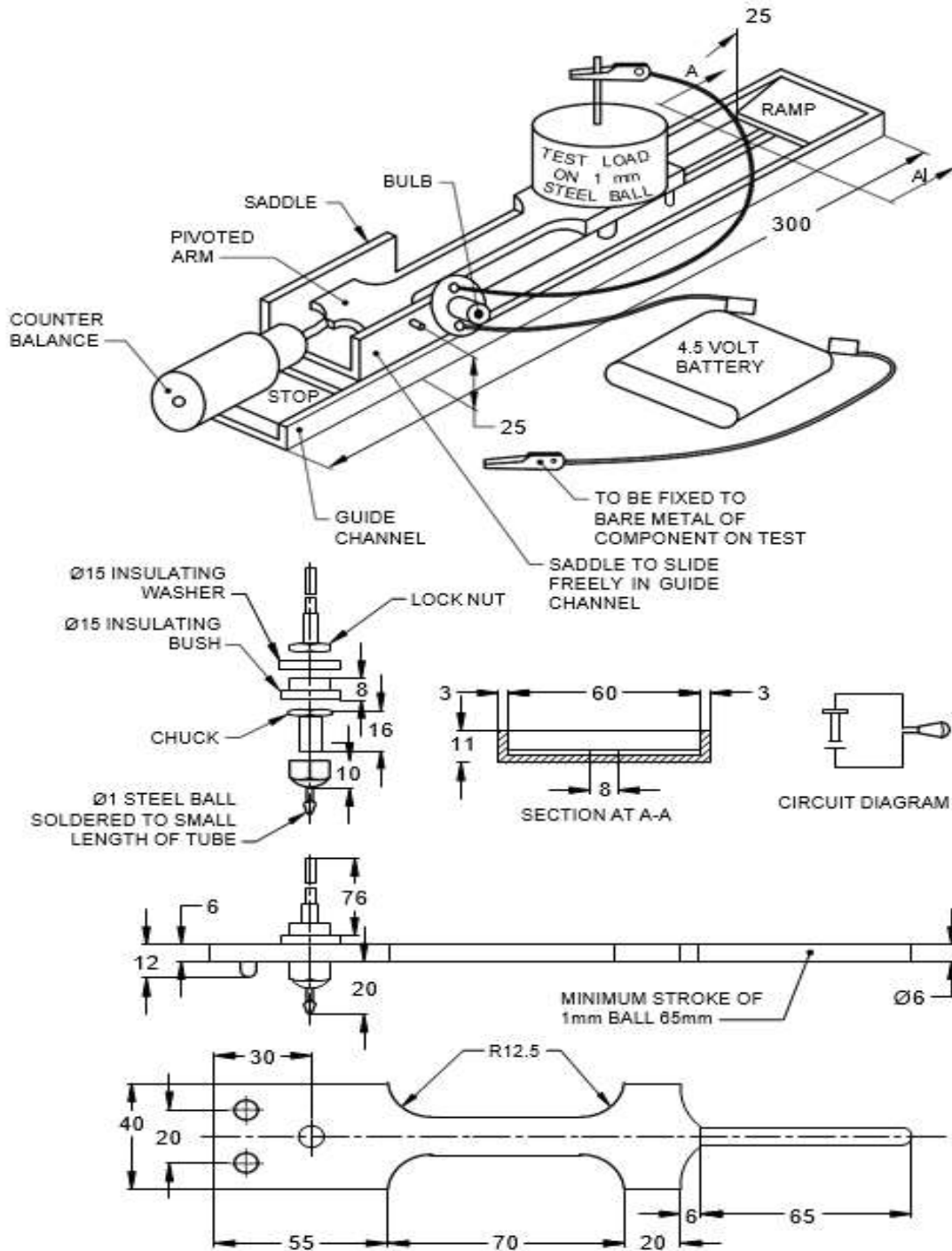
8.5 Concealed Gas Supplies

Concealed tubular fittings liable to corrode shall be protected by bituminous paint or other equally protective material.

8.6 Screw, Nuts, Bolts and Springs

All springs and those screws, nuts and bolts which are visible or which are to be removed for maintenance shall be of corrosion-resistant material or treated to resist corrosion.

8.7 The external finished surfaces shall be easily cleanable.



All dimensions in millimeters
FIG. 2 PAINT SCRATCH TEST APPARATUS

9 GAS TAPS

9.1 The appliance shall have at least one tap for each burner.

9.2 The 'ON, OFF' and any fixed position of tap handles shall be clearly and durably indicated or shall be obvious by design or position (Fig. 2) Where it is not obvious which tap operates which burner, some indication shall be given. All taps shall close in the same direction. The direction of rotation of a tap knob (handle) from off-on-simmer shall be anti-clockwise. Taps shall be designed so that when placed in any position and viewed from a distance of 3 m. will definitely indicate whether the valve is open or closed or in intermediate position.

9.3 Where taps are fitted with adjustable stops. There shall be means for looking the stops in position. If screws are used for this purpose, they shall not lead into gas passages.

9.4 Preferably all taps (excluding pilot taps) should lock in the 'OFF' position, but in all cases it shall be impossible to handle or tap to move accidentally, for example, by the weight of plugs, handle, or when caught by clothing. If this requirement is satisfied by means of an automatic locking device, the tap shall be easy to operate with one hand.

9.5 Taps shall be so made that in normal use and with reasonable application of lubricant, the gas passages do not become blocked (see Fig. 3).

9.5.1 Taps shall be lubricated with suitable grease, resistant to the action of the gas and capable of operating at the maximum temperature of 110°C.

9.6 Each taper plug tap shall be spring-loaded to maintain a gas-tight fit. Helical springs fitted in taps and valves shall have flattened ends, which shall be rounded before fitting.

9.7 Taper plug taps shall have dimensional allowances when in 'OFF' position given in Fig. 4.

9.8 All controls or taps shall be easy to operate at all temperatures normally attained in use.

9.9 Screws nuts etc., which regulate the tension of taps valve or springs, shall not loosen in operation of the appliance. It shall not be possible to cause a leak during normal manual operation of tap.

9.10 Screw-down valves shall be so designed that it is impossible to withdraw completely the valve stem in the normal operation of the tap.

9.11 Taps having an 'OFF' position shall have positive stops at the 'OFF' and simmer position except that special purpose taps (for appliance incorporating auto or self-ignition device), for example, taps with simmering position in between 'OFF' and 'ON' may have a movement beyond the simmer position with a positive stop.

9.11.1 Simmer flame shall be obtained by fixed simmer orifice.

9.12 The noting means adopted shall be sufficiently robust to withstand normal use without distortion or damage.

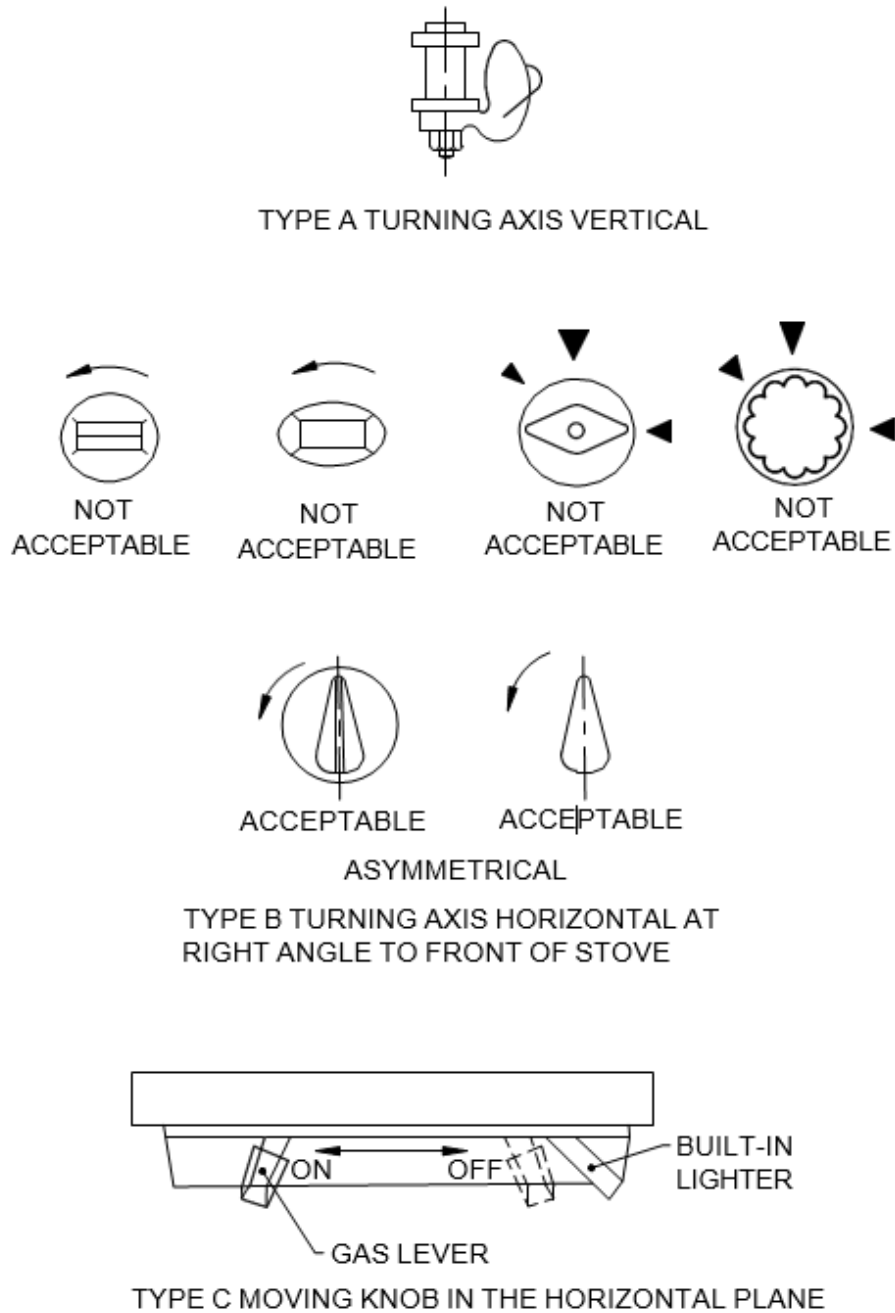


FIG. 3 TYPICAL TYPES OF TAP HANDLES

10 INJECTOR JETS

10.1 The injector Jets shall be fixed calibrated type and it shall not be possible to loosen them without the use of tools. The dimensions of the injector Jet shall conform to the following requirements:

- Across flats 6 mm, Min;
- Projection from the face of mounting 3 mm, nominal; and
- Threads M 5, 1BA, M-6 or any other suitable threads.

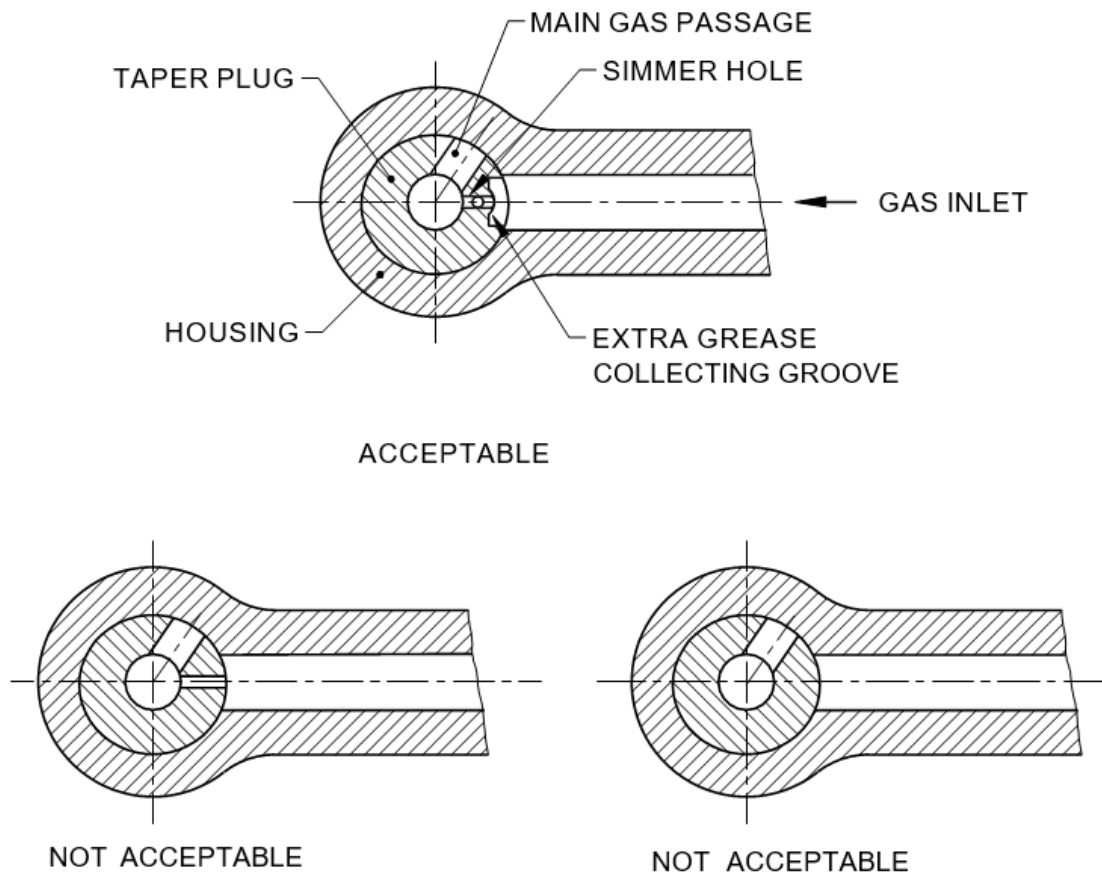


FIG. 4 SIMMER GAS-WAY IN TAPS (AXIAL FLOW)

10.1.1 Injector Jet shall be made of metal, with or without ceramic tip. The melting point of the metal shall not be less than 650 °C.

10.2 The size of the Jet in litres per hour of flow of PNG at STP conditions shall be impressed upon it.

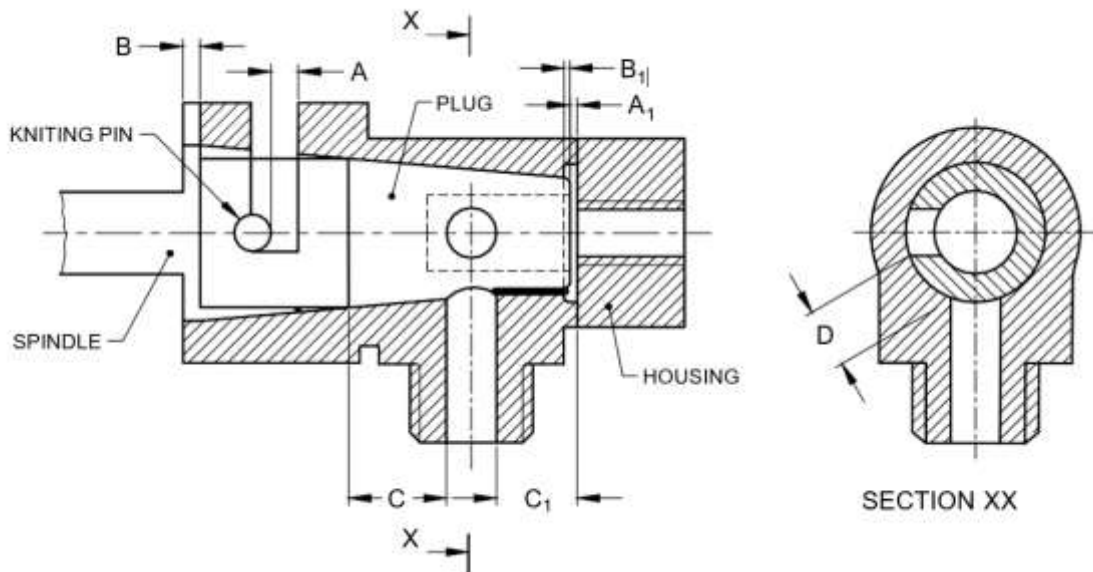
11 BURNERS

11.1 The construction of the burners and the assembly shall allow their dismantling from the supports easily with or without the use of tools (*see* Fig. 5 for guidance).

11.2 The burner supports shall be rigid and shall be fixed in their place. Their construction shall ensure the stability of the burners and shall prevent their undue movement in a horizontal plane.

11.3 The tightness of the joints in the burner assembly shall not be depend upon adhesives or any kind of packing.

11.4 If primary air regulators are used, they shall be so designed that they are not easily maladjusted by the user and the construction shall be such that primary air adjustment can be made with the burner in place (*see* Fig. 6).



A = Top Take Up	1.1 Min
B = Top Ridge Formation Allowance	0.4 Min
C = Bearing Surface Above Gas-way	3.0 Min
D = Circumferential Seal	2.80 Min
A ₁ = Bottom Take Up	1.2 min
B ₁ = Bottom Ridge Formation Allowance	0.4 Min
C ₁ = Bearing Surface Below Gas-Way	3.0 Min

All dimensions in millimetres

FIG. 5 DETAILS OF GAS COCK ALLOWANCES

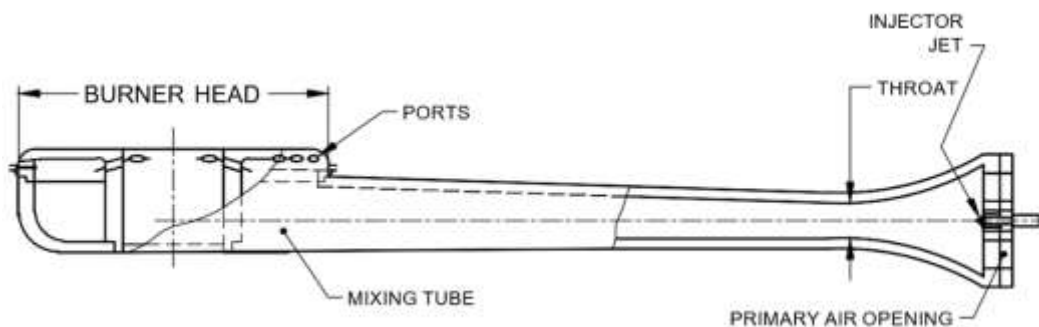


FIG. 6 TYPICAL BURNER ASSEMBLY

11.5 If the burner is made and assembled in two or more parts they shall be so designed to provide proper self-locating arrangement so that they are always re-assembled to its original design

preventing any maladjustment in their assembly. This shall also be applicable for primary air regulators.

11.6 For burners having centre flame, provision shall be made to protect the centre flame from pan resting directly on burner top and smothering the centre flame.

11.7 The appliance comprising two or more burners shall include one burner having a rating of at least 1 450 kcal/hr, based on net calorific value of the gas. (When using domestic PNG).

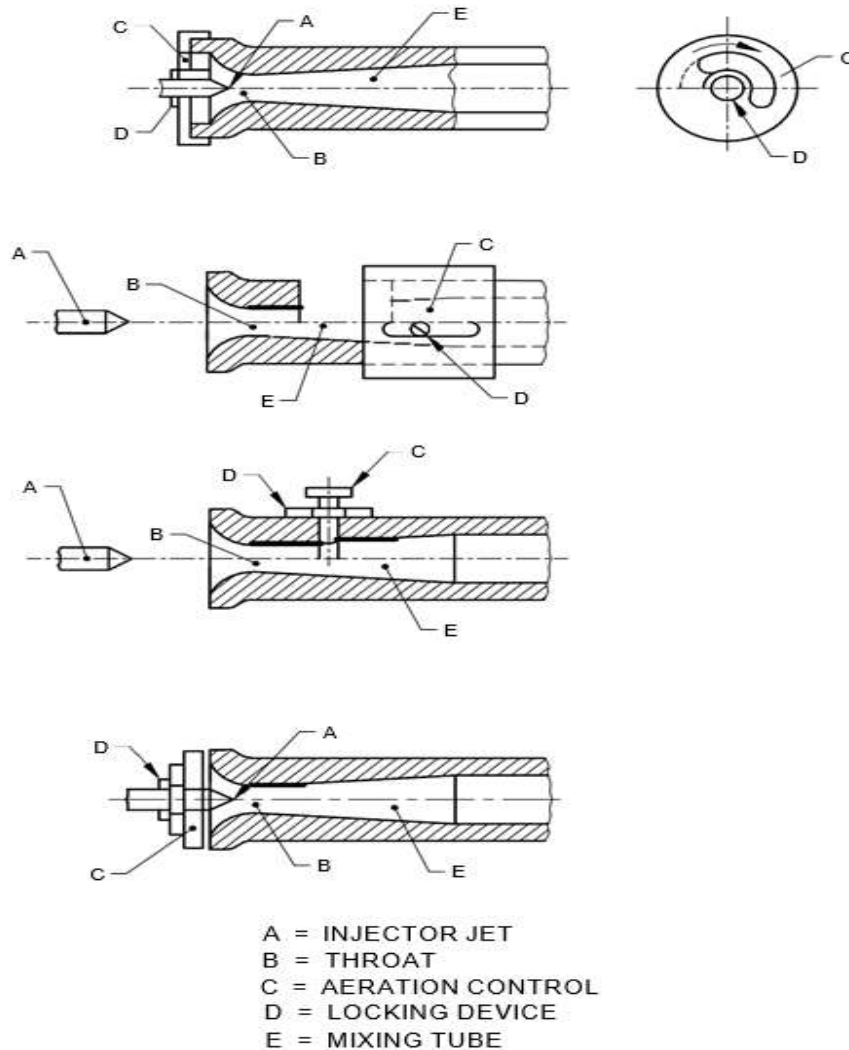


FIG. 7 PRIMARY AIR CONTROLS

12 PAN SUPPORT

12.1 The design of the pan supports shall be such that it is practicable to support a pan of 100 mm diameter, over at least one top burner without the use of loose rings, and such that 125 mm diameter vessel remains stable over each burner. Prongs of the support shall have suitable taper to accommodate round bottom pans.

12.2 Loose pan supports shall be so designed that it is not possible to place them firmly in other than proper position.

12.3 The design of the pan support shall be such that the assembly will remain stable when used with vessel of diameter from 150 mm to 250 mm.

12.4 The material of the pan support shall be metallic.

13 GAS SOUNDNESS

13.1 All gas carrying parts of the appliance shall be sound and those parts when connected to form a complete assembly shall also be sound against any gas leakage. The complete assembly shall also be sound against any gas leakage. The complete assembly shall be checked at 14.71kN/m^2 (approx. 150gf/cm^2). The details of test are given in Annex J of IS 5116.

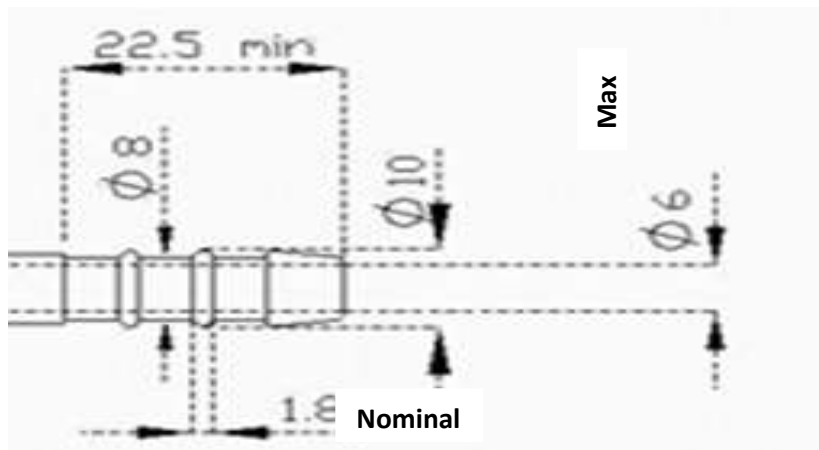
13.2 Gas Leak Detector

13.2.1 The stove may be provided with a gas leak indicator. If gas leak indicator is provided, it shall conform to the requirements of IS 13432 (Part 1).

14 GAS INLET CONNECTIONS

14.1 Nozzles shall be machined from Free cutting brass, MS, SS and Zinc.

14.2 Where nozzles for flexible tubing are fitted, they shall be so positioned as to facilitate fitting of the tubing and also to prevent heating of the tubing to more than 60°C . Shape of nozzles is given in Fig. 8 or 9



Tolerance on all dimensions is ± 0.25 mm unless specified
All dimensions are in millimeters

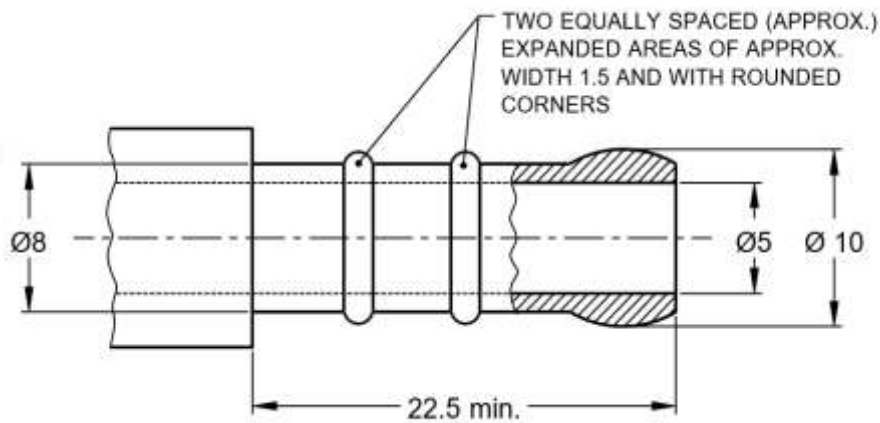
FIG. 8 REFERENCE FIGURE FOR SHAPE OF NOZZLE

14.3 Screwed gas inlet and outlet connections shall conform to IS 554 for gas stoves and built in hobs

14.4 The pipe/tube used for main gas rail shall be metallic. The wall thickness of main gas rail other than the threaded portion to be maintained shall be $1.25^{+0.00}_{-0.25}$ mm in case the gas taps are connected with gas rail through threaded bushes. The wall thickness of main gas rail (other than threaded portion) to be maintained shall be $0.9^{+0.00}_{-0.09}$ mm when the gas taps are connected with gas rail with clamps. The external surface of the gas rail shall be treated to resist corrosion. Any other connection made from the main gas rail shall be only metallic for gas stoves and built in hobs.

14.5 The position of the gas inlet shall allow connection to a gas supply on either side of the appliances. Inlet connection at the rear end or bottom is also permitted. It shall be possible to change gas inlet from one side to other side easily by standard tools. Revolving Nozzle may be permitted to be fitted on the rear side. For gas stoves.

14.6 The position of the gas inlet for Built in Hobs shall be at the bottom on either side of the appliance.



All dimensions in millimeters.
FIG. 9 NOZZLE FOR 6.4 MM BORE TUBING

15 STRENGTH AND RIGIDITY

For metallic body, when tested as specified in Annex B, the vertical resultant deflection of the top surface measured at the center of length of the body, shall not exceed 2 mm and the distance between the opposite sides (lengthwise and widthwise) shall not change by more than 5 mm. This test shall be applicable for metallic body gas stoves only.

SECTION 2 PERFORMANCE

16 GENERAL CONDITIONS OF TEST

The relevant requirement given in **19** of IS 5116 shall apply.

17 GAS CONSUMPTION

17.1 Each Burner assembly under separate 'ON/OFF' control shall give ± 8 percent of the manufacturers' specified gas consumption in l/h or heat input in kcal/h at 21 mbar (21.41 gf/cm²) gas inlet pressure when measured by volumetric method with a wet gas flow meter (One revolution of 3 litre capacity, minimum with 10 ml. least count) using compressed air (27 °C and 760 mm mercury). Thereafter using 1.43 as multiplying factor, the value of air flow at STP so obtained to be converted to flow of PNG at STP.

NOTE — Compressed air shall be stored in a reservoir tank for 1 hour between at 25 to 30 degree centigrade.

17.1.1 When tested for gas consumption, the apparatus shall be setup as given in Annex D. The measurement of volume shall be made with a wet gas flow meter and with minimum consumption of 6 litres or volume displacement of two revolutions of the drum whichever is higher.

17.1.2 Multi burner appliances (namely, appliances having more than one burner) shall give within +5 and -15 percent of the declared total gas consumption in m³/h or heat input in kcal/h at 21 mbar (21.41 gf/cm²) gas inlet pressure with commercial PNG and with all the taps turned on.

NOTE – For guidance 1 litre = 0.001 m³.

17.2 For Gas Stoves

It shall be possible to reduce the maximum consumption rate of each burner to 35% or lower of the rated capacity

17.3 For Built in Hobs

It shall be possible to reduce the maximum consumption rate of the burner to 50 percent of the rated capacity by providing a fixed or variable simmer orifice in the gas tap.

17.4 When the gas consumption of a burner is reduced to simmer as described in **17.2** and **17.3**, the flame shall not extinguish, blow off, strike back or form soot when tested with PNG at 21 mbar (21.41 gf/cm²) gas inlet pressure.

18 IGNITION AND FLAME TRAVEL

18.1 There shall be easy and safe access for lighting and relighting each burner by a match stick and it shall be easy to see that the burner is lighted. Where the burner or burners are lighted by a pilot flame, it shall not be possible for gas to be admitted to the main burner without being smoothly ignited by the pilot flame. Each burner should be at room temperature at the beginning of the test and should be tested in turn.

18.2 If a flame is applied to any of the outer row of the burner ports when the gas is flowing, flame travel shall be complete. This applies for the all pressures from 1.9613 to 2.450 kN/m² (20gf/cm² to 25 gf/cm²), taps being fully opened and without a pan over the burner.

18.3 When the burner is ignited from a pilot flame and / or by an electric/electronic method, the ignition and flame travel shall be smooth at pressure from 1.9613 to 2.450 kN/m² (20gf/cm² to 25

gf/cm²) with the burner tap turned full 'ON' and ignition shall be effected without undue delay after turning on taps.

18.4 When flame failure devices are used, it shall conform to **14** of IS 5116.

19 FLAME STABILITY

19.1 It shall be possible to operate the appliance with taps fully open at gas inlet pressure from 1.9613 to 2.450 kN/m² (20gf/cm² to 25 gf/cm²) without the flame extinguishing, blowing off or striking back and without the formation of soot.

19.2 When the gas consumption of a burner is reduced to simmer after operating for half an hour at full 'ON', the flame shall not extinguish, blow off, strike back or form soot when tested with commercial LPG at 21 mbar (21.41 gf/cm²) gas inlet pressure.

19.3 Pilot flames shall be stable, without lifting or soot deposition, at gas inlet pressure from 1.9613 to 2.450 kN/m² (20gf/cm² to 25 gf/cm²)

19.4 The fixed minimum pilot rate shall be sufficient to relight the main burner 21 mbar (21.41gf/cm²) gas inlet pressure.

20 NOISE CONTROL

The ignition of the burner flames, their operation and turning 'OFF' shall not give rise to undue or excessive noise during all the operations.

21 FLASH BACK

21.1 A vessel having diameter suitable to cover the pan supports duly filled with water, shall be placed on the burner under test. The tap of the burner shall be turned 'ON' and gas shall be allowed to flow through the burner at full rate, with taps fully opened and gas lighted. After half an hour, the flame shall be immediately reduced to simmer and then brought back to full size. The operation shall be repeated five times. No flash back shall occur during the test. This applies for all pressures from 1.9613 to 2.450 kN/m² (20gf/cm² to 25 gf/cm²). Suitable flame control valve which will allow unidirectional flow of PNG towards burner can also be used.

22 FORMATION OF SOOT

22.1 A vessel, 150 mm diameter, full of water, shall be placed on the burner and the burner lighted at 'ON' position of the tap for one hour. After the test, no soot (unburned carbon) shall be deposited on the burner and on the bottom of the vessel. This applies for all pressures from 1.9613 to 2.450 kN/m² (20gf/cm² to 25 gf/cm²).

23 RESISTANCE TO DRAUGHT

23.1 There shall be no extinction of the flames on any of the burners operating at maximum consumption when the appliance is placed in a general (not localized) current of air with a velocity of 2 m/s, as measured with a rotating vane anemometer. The location of the appliance relative to

neighboring walls and the direction of the draught shall be varied to correspond to likely conditions of appliance installation. This applies for all pressures from 1.9613 to 2.450 kN/m² (20gf/cm² to 25 gf/cm²).

24 COMBUSTION

24.1 When tested according to the method laid down in Annex E, on no account the carbon monoxide/ carbon dioxide ratio of the exhaust gases of any burner, operating at any consumption at which the burner is stable at gas inlet pressure from 1.9613 to 2.450 kN/m² (20gf/cm² to 25 gf/cm²), exceed 0.02. It shall also be possible to obtain the required carbon monoxide/carbon dioxide ratio with the pan supports reversed or put in any other possible position or with a large skirted vessel placed over any burner. This test need not be performed on burners with a gas rate of less than 20 l/h at 21 mbar (21.41 gf/cm²) gas inlet pressure.

24.2 The carbon dioxide and carbon monoxide content of the products of combustion shall be determined by the methods capable of giving accuracy of 0.5 percent and 0.001 percent, respectively, of the volume of the sample.

25 FIRE HAZARD AND LIMITING TEMPERATURES

25.1 In addition to the relevant requirements given in 23 of IS 5116, requirements given in 25.2 shall apply. The requirement shall be tested by the method given in Annex G.

25.2 With burner lighted at full 'ON' position, the temperature of the flame at any point in a plane at a height of $H + 20$ mm from the top of the pan support shall not exceed 500 °C, H is the pan height corresponding to the gas rate of the burner as shown in col 3 of Table 1 under Annex F. This test shall be performed on each burner. K type Thermocouple made from 0.5 mm diameter wire and placed in the center of stainless steel tube having outside diameter 10 mm *Max* and closed at the end along with temperature indicator shall be used for the measurement of the temperature.

26 THERMAL EFFICIENCY

26.1 For Gas Stoves

When tested as specified in Annex F, the thermal efficiency shall be minimum 55 percent for each burner of gas stove with the pan placed correctly on the pan supports at 21 mbar (21.41 gf/cm²). For this test, the net calorific value of the gas shall be employed. If this is not determined experimentally, the value may be taken as 8 kcal/l for calculation. Thermal efficiency may be declared for a batch production, if it is 65 percent and above as verified by BIS.

26.2 For in Built Hobs

When tested as specified in Annex F, the thermal efficiency shall be minimum 50 percent for each burner of built in hob with the pan placed correctly on the pan supports at 21 mbar(21.41 gf/cm²). For this test, the net calorific value of the gas shall be employed. If this is not determined experimentally, the value may be taken as 8 kcal/l for calculation. Thermal efficiency may be declared for a batch production, if it is 60 percent and above as verified by BIS.

27 CLASSIFICATION OF TESTS

27.1 Type Test

The following shall constitute type tests:

- a) Strength test (*see 15*);
- b) Gas consumption (*see 17*);
- c) Flashback test for materials of burners (*see 5.2* of IS 5116);
- d) Formation of soot (*see 22*);
- e) Resistance to draught (*see 23*);
- f) Combustion test (*see 24*);
- g) Fire hazard and limiting temperature (*see 25*); and
- h) Thermal efficiency (*see 26*).

27.2 Routine Tests

The following shall be carried out as routine tests:

- a) Gas soundness (*see 13*);
- b) Ignition and flame travel (*see 18*);
- c) Flame stability (*see 19*);
- d) Noise control (*see 20*); and
- e) Flash back (*see 21*).

SECTION 3 GENERAL

28 INSTRUCTIONS

28.1 The appliance shall be accompanied by an instruction card giving the following information:

- a) Brief instructions for installation and regulation which include piping and fitting of terminal, if any;
- b) Rating of the burners in litre/hr or kcal/h (with PNG);
- c) Total gas consumption in m³/h.
- d) Instructions for the correct operation of the appliance;
- e) Country of origin;
- f) The words 'For use with PNG at 21 mbar (21.41 gf/cm²)'.

29 MARKING

29.1 Each appliance shall be legibly and indelibly marked with the following:

- a) Manufacturer's name and/or initials or registered trade-mark;
- b) Total gas consumption in m³/h (with PNG);
- c) Rating of the burners in kcal/h (with PNG);
- d) Any special instructions for the safe use of the appliance;
- e) The words 'For use with PNG at 21 mbar (21.41 gf/cm² approximately)';
- f) Country of origin; and

- g) Thermal efficiency may be declared, if it is 65 percent and above for Gas stoves and/or 60% and above for Built in Hobs as verified by BIS.

29.2 BIS Certification Marking

29.2.1 The gas stoves may also be marked with the Standard Mark.

29.2.2 The use of Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 2016* and the rules and regulations made thereunder. The details of conditions under which a license for the use of the Standard Mark maybe granted to manufacturers or producers may be obtained from Bureau of Indian Standards.

30 PACKING

The gas stoves shall be packed as agreed to between the purchaser and the supplier, taking care of safety requirements as such during handling and transit to protect against damages.

ANNEX A

(Clause 2)

LIST OF REFERRED INDIAN STANDARDS

<i>IS No.</i>	<i>Title</i>
IS 6480 : 2023	Terms Relating to Domestic and Commercial Gas Burning Appliances — Glossary (<i>second revision</i>)
IS 5116 : 2020	Domestic and Commercial Equipment for Use with LPG — General Requirements (<i>fourth revision</i>)
IS 617 : 1994	Aluminium and aluminium alloy ingots and castings for general engineering purposes (<i>third revision</i>)s
IS 1264 : 1997	Brass gravity die castings (ingots and castings) (<i>fourth revision</i>)
IS 319 : 2007	Free cutting brass bars, rods and section — Specification (<i>fifth revision</i>)
IS 4454 (Part 4) : 2001	Steel wires for mechanical springs: Part 4 Stainless steel wire (<i>second revision</i>)
IS 2501 : 1995	Solid drawn copper tubes for general engineering purposes (<i>third revision</i>)
IS 410 : 1977	Cold rolled brass sheet, strip and foil (<i>third revision</i>)
IS 3203 : 1982	Methods of testing local thickness of electroplated coatings (<i>first revision</i>)
IS 13432 (Part 1) : 1992	Gas leak detector for use with low pressure liquefied petroleum gas burning appliances : Part 1 mechanical type
IS 2305 : 1988	Method for mercurous nitrate test for copper and copper alloys (<i>first revision</i>)
IS 554 : 1999	Pipe threads where pressure - Tight joints are made on the threads - Dimensions, tolerances and designation (<i>fourth revision</i>)
IS 2553 (Part1) : 2018	Safety glass — Specification: Part 1 architectural, building and general uses (<i>fourth revision</i>)
IS 14900 : 2018	Transparent float glass — Specification (<i>first revision</i>)
IS 6506 : 1972	Methods for thermal shock tests on glassware

ANNEX B
(Clause 15)

STRENGTH AND RIGIDITY TEST

B-1 PROCEDURE

B-1.1 The rubber support (grommet) if any, shall be removed and replaced with identical metal supports. If the material of the legs is other than hard rubber, the test shall be carried out with the original legs in place. The pan support and burner shall be removed and the distance between the sides of the appliance body being tested shall be measured.

A reference reading at the top surface of the body at the centre of the width shall be taken. A load of 250 N (25 kg) per burner shall be applied at the top surface subject to a minimum load of 500 N (50 kg) for a single burner stove. The load shall be applied without impact to a strip of steel having 20 mm thickness, 100 mm width and as long as the length of the appliance (*see* Fig. 2). This strip shall be placed in the centre of the top surface of the appliance and its length parallel to the front. The load shall be maintained for five minutes after which the measurement for deflection at top surface of body (at the centre of the width just in front of the strip) shall be taken with the load in position.

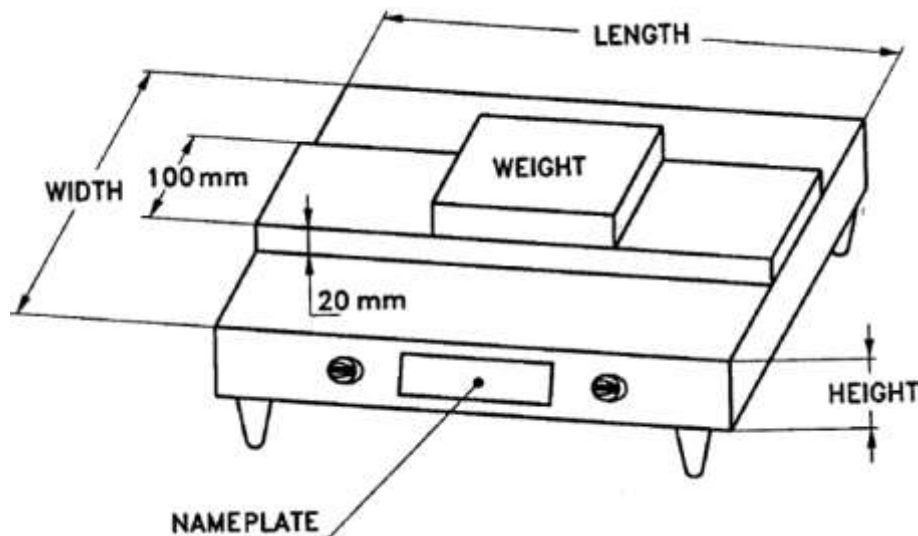


FIG. 2 STRENGTH TEST

ANNEX C
[Clause 5.7.1 (d)]

THERMAL SHOCK TEST

C-1 PROCEDURE

C-1.1 Vessels having diameter suitable to cover the pan supports duly filled with water shall be placed on all the burners of the appliance. The taps of the burners shall be turned on and gas shall be allowed to flow through the burners at full rate. After 30 minutes turn off all the taps. Pour one-liter water at a temperature of 15 ± 5 °C steadily and uniformly on the glass surface. This glass should not chip, crack or break.

C-1.2 Check the adhesive tape pasted on the glass, it should not burn or peel off.

ANNEX D
(Clause 17.1.1)

GAS CONSUMPTION TEST

D-1 PROCEDURE

D-1.1 The stove shall be set in accordance with 16 with the addition of a suitable device for measuring gas consumption. The wet gas meter, which is an instrument commonly used for this purpose, shall be set up in series with stove under test (*see Fig. 3*).

D-1.1.1 Clean and dry air shall be passed at 21 mbar (21.41 gf/cm²) inlet pressure through the stove for a few minutes to purge the system of air and to establish the gas pressure required. Only one burner of the appliance shall be tested at a time and during the test all gas delivered to the stove shall flow through the jet of the burner being tested.

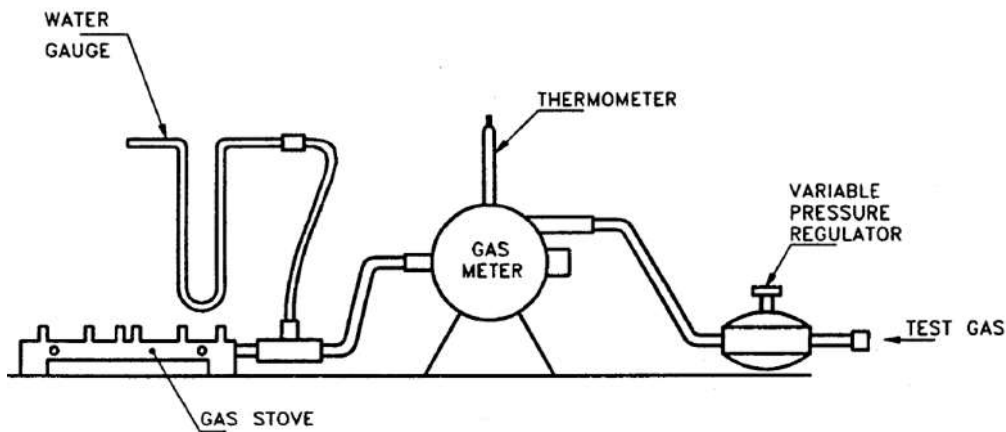


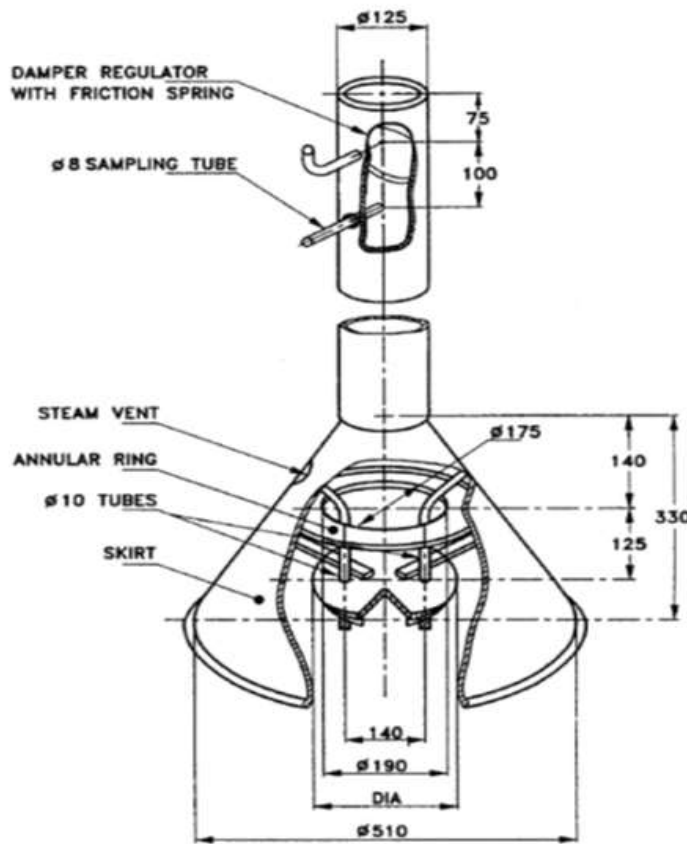
FIG. 3 TEST SET-UP FOR GAS CONSUMPTION

ANNEX E
(Clause 24.1)

**TEST METHOD FOR DETERMINATION OF CARBON
MONOXIDE/CARBON DIOXIDE RATIO**

E-1 PROCEDURE

E-1.1 The appliance shall be set-up in accordance with 16. Before starting the test, a pan of 190 mm diameter and of suitable height and containing water sufficient for the test shall be placed over the burner. In addition, a collecting hood (see Fig. 4) suitable for the burners under examination shall be obtained.



(All dimensions in millimeters)

FIG. 4 TYPICAL FIG OF HOOD FOR BURNER

E-1.1.1 The hood shall be so designed that, while not interfering in any way with the normal combustion of the burner, it collects a fairly high proportion of the products of combustion. Also, it shall be such that the sample collected represents the whole of the combustion gases and not those from any particular point.

When using this hood, the damper provided shall be set or additional flue pipe added, so that spillage of the flue gases around the skirt is just prevented. With the sample hood in position over

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the burner under investigation, gas at inlet pressure of 21 mbar (21.41 gf/cm²) shall be admitted and the burner operated for a 5 to 10 minutes till the steam is out before sampling commenced. The reason for this being that during the first 5 to 10 minutes the burner is warming up and the proportion of carbon monoxide may be high. However, this is not dangerous provided the burner works satisfactorily after heating up.

E-1.2 Any of the recognized methods having the prescribed accuracy may be used for gas analysis. For carbon monoxide, it is recommended that co-indicator of prescribed accuracy or iodine pentoxide method or catalytic method, for example, Dragger method, the Katz method or infrared analysis methods may be used. Carbon dioxide may be tested with an Orsat apparatus, the Haldane apparatus or by infrared analysis.

E-1.3 Each burner shall be examined with gas at 1.9613 to 2.450 kN/m² (20gf/cm² to 25 gf/cm²) inlet pressure. It shall also be noted that each burner is tested separately or with all the possible combination of the other burners operating.

ANNEX F
(Clause 26)
THERMAL EFFICIENCY

F-1 Thermal Efficiency Test (Volumetric Method)

F-1.1 The stove shall be setup in the manner as described in **16**. The stove under test shall be connected as indicated in Fig. 12 and PNG inlet pressure at burner/ stove may be set at 21 mbar (21.41 gf/cm²) for carrying out thermal efficiency with burner 'ON'. The gas shall be passed for a few minutes to purge the system of air and to establish the required gas pressure. Only one burner of the appliances shall be tested at a time and during the test, all the gas delivered to the stove shall flow through the jet of the burner being tested. The pan shall be selected for the burner under test in accordance with Table 1.

F-1.2 The pan with the lid and stirrer shall be filed with requisite quantity of distilled water and placed centrally over the burner being tested. The initial temperature of water (t_1) and the initial gas flow meter (type of gas flow meter to be specified for uniformity in testing) reading (V_1) shall be recorded. The gas tap shall be turned "ON" and gas ignited. The water in pan shall be allowed to warm steadily until it reaches a temperature of about 80 °C, then stirring commenced and continued until the end of the test. When the water temperature reaches 90 ± 0.5 °C, The Gas tap shall be turned "OFF". The stirring shall be continued and maximum temperature (t_2) shall be recorded. The final gas flow meter reading (V_2) to be recorded. The quantity of the gas used during the test shall be calculated from the initial and final gas flow meter reading that is, ($V = V_2 - V_1$) deduced by observing the Gas flow meter.

F-1.3 The useful heat obtained from the burner is the mass of the water used in kg plus water equivalent of vessel with the lid and stirrer, multiplied by the temperature rise in degree Celsius obtained. The heat input into the appliance is the corrected volume of the gas used in litres, multiplied by calorific value of the gas used in kcal/l. The thermal efficiency shall be calculated by the following formula:

$$e = \frac{100 (G+W)(t_2-t_1)}{VH}$$

- e = Thermal efficiency of the used burner, in present;
 G = quantity of water in vessel, in kg;
 W = Water equivalent of the vessel complete with lid and stirrer;
 t_2 = final temperature of water, in °C;
 t_1 = initial temperature of water, in °C;
 V = gas consumption, in liters; and
 H = calorific Value of the gas, in kcal/l.

F-1.4 In performing the thermal efficiency test, the following points shall be noted:

- a) The set-up shall be carefully checked for leak, before and after the test. If a leak is found after the tests, the results should be cancelled and the test repeated;
- b) The room shall be free from draught;

- c) The initial temperature of the room shall be between 25 °C and 30 °C;
- d) The water temperature shall be within ± 2 °C of the actual room temperature;

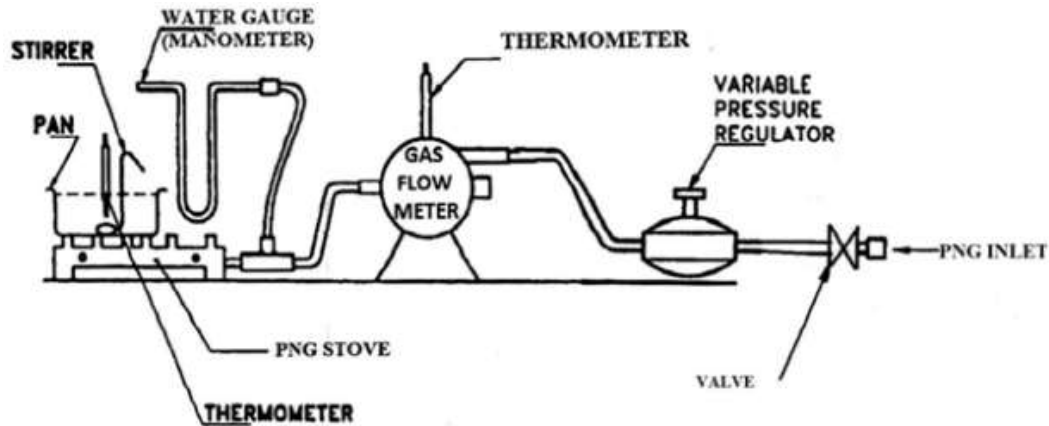


FIG. 12 THERMAL EFFICIENCY TEST FOR PNG STOVE

- e) The net calorific value may be determined through actual gas composition analysis or used on the basis of the information provided by the PNG supplier;
- f) At the start of the test, the burner shall be at room temperature;
- g) The temperature of the water shall be measured by means of a thermometer/temperature indicator with accuracy of 0.5° C, the bulb/sensor of which is immersed to half the depth of the water in vessel;
- h) Stirring shall be effected by means of a horizontal loop of approx. 3 mm aluminum metal rod attached to an upright, which passes through a approx. 6 mm, hole drilled in lid;
- j) This test need not be performed on burners with a gas rate of less than 60 l/h at 21 mbar (21.41 gf/cm²) inlet pressure;
- k) Specific heat of aluminum is 0.214;
- m) The accuracy of gas flow meter shall be of 10 ml for gas consumption.

Table 1 Aluminium Pans for Thermal Efficiency Test
(Clause F-1.1)

Gas Rate at STP l/h (1)	Pan Diameter (External) Mm, ± 5 Percent (2)	Pan Height (External) Mm, ± 5 Percent (3)	Total Pan Mass with LID g ± 10 Percent (4)	Mass of water in Pan kg (5)
Up to 150	180	100	356	2.0
151 to 170	205	110	451	2.8
171 to 180	220	120	519	3.7
181 to 190	245	130	632	4.8
191 to 200	260	140	750	6.1
201 to 210	285	155	853	7.7
211 to 230	295	165	920	9.4
231 to 240	305	175	1000	10.4
241 to 250	315	185	1100	12.0

NOTES

- 1 Distilled water (see IS 1070) shall be used for test.
- 2 The pan shall be cylindrical with flat bottom.
- 3 The finish of the pan bottom from inside shall always be bright.

ANNEX G
(Clause 25.1)

**METHOD FOR MEASUREMENT OF FLOOR, WALL
AND CEILING TEMPERATURES**

G-1 APPARATUS

G-1.1 The apparatus shall consist of a wooden floor with side and back walls (*see* Fig. 13). The floor shall be approximately 5 cm thick and consist of a 2.5 cm layer of pine below a 2.5 cm layer of any timber with natural colour nearing white or off-white finished in clear varnish with a thickness of building paper between them. Both the side and back walls shall be of 2.5 cm pine and painted dull black. The apparatus shall be large enough to accommodate almost any appliance, and the side wall shall be detachable so that measurement can be made if necessary against both sides of the appliance.

G-1.2 T- type thermocouples shall be embedded in each panel at 15 cm intervals and in such a way that the junctions are filed in position 2 mm from the wood surface. They shall be conveniently inserted in holes of 8 mm diameter with a thermo-junction bent at a right angle and sealed in position with insulating cement. It shall be necessary to arrange for successive readings to be made from each thermo-junction, a convenient method of doing this is to connect all terminals of one sign to a single terminal and each terminal of the opposite sign to a separate terminal of a switchboard. Temperature shall be measured using these thermojunctions.

G-2 PROCEDURE

G-2.1 Before commencing tests with a new apparatus, dry it out thoroughly either by previous test or by heating it for 24 h with an appliance in position and operating at maximum gas rate in order to dry out the wood and secure reproducible results. This procedure is not necessary in subsequent tests. Appliances installed on or near walls and floor as intended for normal use shall not give rise in operation to wall, floor or ceiling temperature in excess of 65 °C above the room temperature after 2 h operation. This requirement shall be tested by the method given in **25.1.1**.

G-2.2 Arrange the appliance under examination so that it is as close as possible to the side and back walls of the apparatus described in L-1, taking note of the manufacturer's installation instructions. Light all the burners and place a 15 cm diameter vessel (with lid) containing about 2 kg water on each top burner. As soon as the water in the vessel boils, reduce the gas rate so that it is just kept boiling. Measure the floor and wall temperatures at the junctions most affected by the heat of the appliance after 2 h of operation and at any intermediate time from the initial lighting if it is considered that certain local temperatures have been reached a maximum.

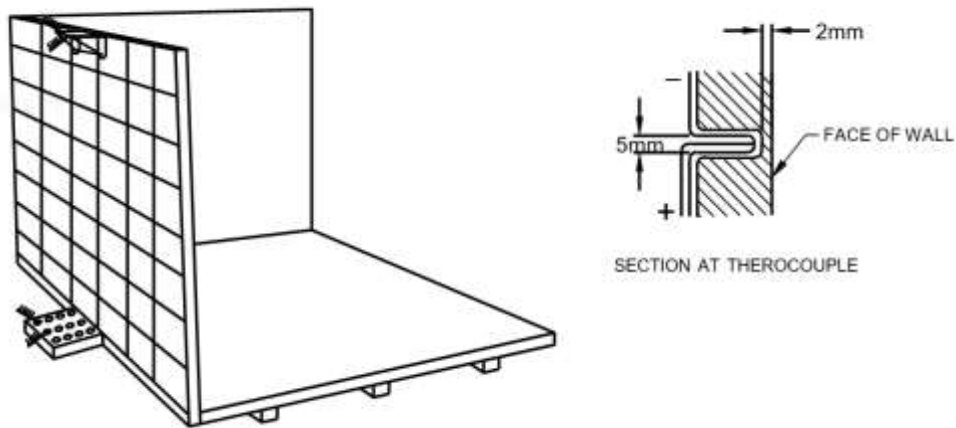


FIG. 13 APPARATUS FOR MEASURING FLOOR, WALL AND CEILING TEMPERATURE

G-2.3 Ceiling Temperature

Raise the back panel and use the side panel as 'ceiling' resting on the top edge of the raised back panel and support at front edge by convenient stand. Operate the appliance as described in 25.1.1 and record the temperature on the ceiling panel supported 1 m above the top of the appliances.

G-2.4 Surface Temperatures

When operated as described in 23.1 no portion of the surface of the appliance, other than a working surface, likely to be accidentally touched shall exceed 120 °C (working surfaces include pan supports, oven flue outlets, grill covers and plate racks).

G-2.4.1 Surfaces which is normal use have to be touched for short periods (for example, tap handles), shall not have a temperature exceeding 60 °C.

G-2.4.2 The temperature of synthetic rubber diaphragm in gas carrying components shall not exceed box.

G-2.4.3 With burner lighted at full 'ON' position, the temperature of the flame at any point in a plane at a height of $H+20$ mm from the top of the pan support shall not exceed 500 °C, H is the height corresponding to the gas rate of the burner as shown in col. 3 of Table 1.