

ANNEX A
(Clause 2)
LIST OF REFERRED STANDARDS

<i>IS No.</i>	<i>Title</i>	<i>IS No.</i>	<i>Title</i>
IS 1070 : 2023	Reagent grade water — Specification (<i>fourth revision</i>)	IS 2553 (Part 1) : 2018	Safety glass — Specification: Part 1 Architectural, building and general uses (<i>fourth revision</i>)
IS 13432 : 2023	Mechanical type gas leak detector for use with low pressure liquefied petroleum gas burning appliances — Specification (<i>first revision</i>)	IS 5116 : 2020	Domestic and commercial equipment for use with LPG — General requirements (<i>fourth revision</i>)
IS 14900 : 2018	Transparent flat glass — Specification (<i>first revision</i>)		

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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. 3). 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.

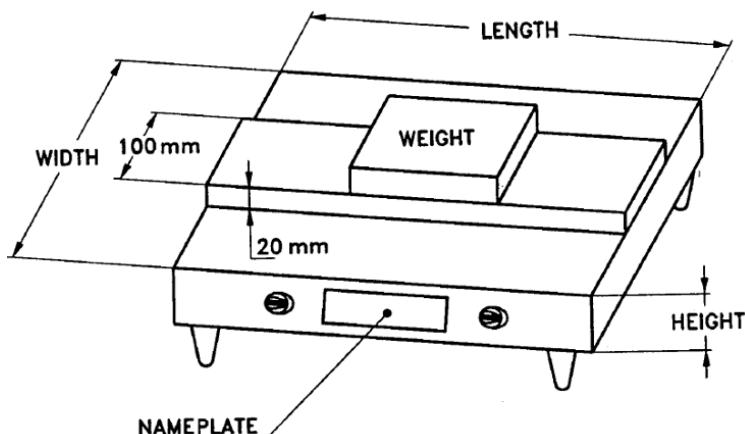


FIG. 3 STRENGTH TEST

ANNEX C

[Clause 5.1.1 (d) and (e)]

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 min

turn off all the taps. Pour one-liter water at a temperature of $15^{\circ}\text{C} \pm 5^{\circ}\text{C}$ 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/built in hob 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/built in hob under test (see Fig. 4).

D-1.1.1 Clean and dry air shall be passed at 2.942 kN/m^2 (30 gf/cm^2) inlet pressure through the stove/built in hob 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/built in hob shall flow through the jet of the burner being tested.

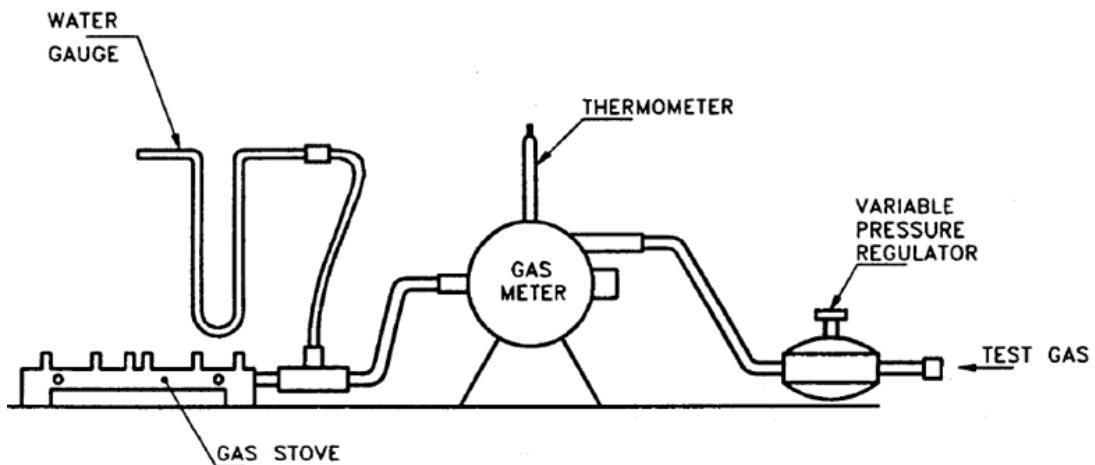


FIG. 4 TEST SET-UP FOR GAS CONSUMPTION

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. 5) suitable for the burners under examination shall be obtained.

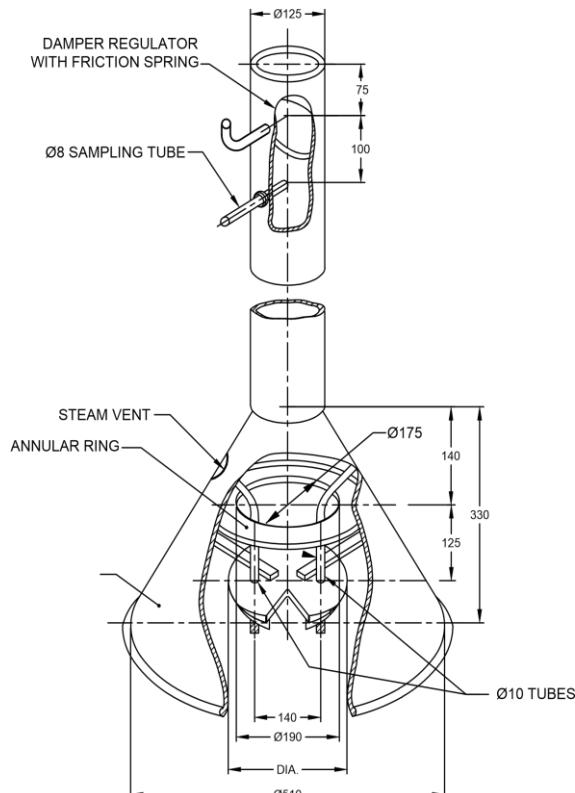
E-1.1.1 The hood shall be so designed that, while not interfering in any way with the normal combustion of the burner, it collects a fairly high proportion of the products of combustion. Also, it shall be such that the sample collected represents the whole of the combustion gases and not those from any 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 the burner under investigation, gas at inlet pressure of 2.452 kN/m² (25 gf/cm²) shall be admitted and the burner

operated for a 5 min to 10 min till the steam is out before sampling commenced. The reason for this being that during the first 5 minutes 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 2.452 kN/m² to 3.432 kN/m² (25 gf/cm² to 35 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.



(All dimensions in millimetres.)

FIG. 5 HOOD FOR BURNER

ANNEX F

(Clauses 25.2, 26.1 and 26.2)

THERMAL EFFICIENCY TEST

F-1 PROCEDURE

F-1.1 The test shall be carried out by weighing the gas used. The gas shall be taken from a small cylinder containing LPG weighing up to 5 kg, keeping accuracy of balance to measure gas same as 0.1 g. The bottle shall be fitted with an 'On/Off' valve and shall be connected to a regulator which, in turn, shall be connected to a pressure gauge and to the appliance. A second 'On/Off' gas valve shall be inserted in the gas ways upstream of the regulator as near as possible to the gas bottle. A typical layout of set-up necessary for this test is shown in Fig. 6.

F-1.2 The gas shall be passed at 2.942 kN/m² (30 gf/cm²) inlet pressure through the stove/ built in hob for 15 s 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/ built in hob shall flow through the jet of the burner being tested. The pan shall be selected and loaded in accordance with the requirements given in Table 1 and placed centrally over the burner being tested. The temperature of the water t_1 contained shall be noted and recorded as long as it remains constant. The bottle shall be disconnected, weighed, reconnected and valves (1) and (2) opened. The gas control tap shall then be opened and the gas shall be ignited. The water shall be allowed to warm up to about 80 °C when stirring is commenced and continued until the end of the test. The burner shall be put off when the temperature of water reaches 90 °C ± 1 °C. The stirring shall be continued and the maximum temperature t_2 shall be noted.

Next, the valves on the bottle and the gas line shall be closed and the bottle shall be disconnected and re-weighed. It is thus possible to estimate the mass of gas used during the period taken for the water to heat up. Thermal efficiency shall be calculated by the following formula:

$$E = \frac{100 (G + W)(t_2 - t_1)}{MK}$$

where

E = thermal efficiency of the burner in percent;

G = quantity of water in the vessel, in kg;

K = actual calorific value of the gas in kcal/kg alternatively 10 900 kcal/kg.

M = gas consumption, in kg;

t_2 = final temperature of water in °C;

t_1 = initial temperature of water in °C; and

W = water equivalent of the vessel complete with stirrer and lid;

F-2 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. The water temperature shall be within ± 2 °C of the actual room temperature;
- d) The net calorific value of gas is used. If this is not determined experimentally, the value may be taken as 10 900 kcal/kg for calculation;
- e) At the start of the test, the burner shall be at room temperature;
- f) The temperature of the water shall be measured by means of a device of at maximum 0.5 °C accuracy the sensitive part of which is immersed to half the depth of the water in vessel
- g) Stirring shall be effected by means of a horizontal loop of 3 mm metal rod attached to an upright, which passes through a 6 mm, hole drilled in lid;
- h) This test need not be performed on burners with a gas rate of less than 20 l/h at 2.942 kN/m² (30 gf/cm²) inlet pressure;
- j) Accuracy of weighing balance used shall be of 0.1 g for consumption measurement and 1 g for other weights;
- k) Specific heat of aluminium is 0.214; and
- m) For conducting thermal efficiency test, gas from the commercial cylinder (bottle) of LPG, the first two-thirds of which has been allowed to evaporate (to waste or in vapour withdrawal use), the remaining one-third shall be used for test. The use of last 1 kg or 2 kg of gas shall be avoided as this may contain heavy ends.

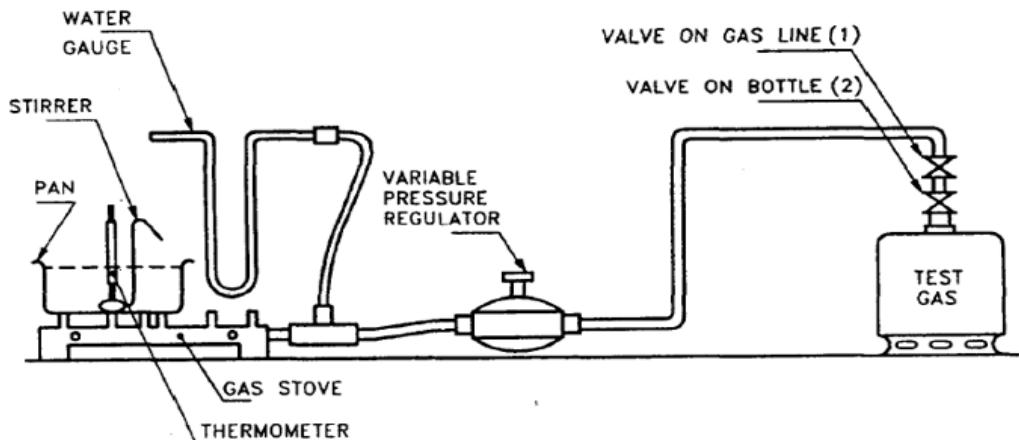


FIG. 6 TEST SET-UP FOR THERMAL EFFICIENCY BY WEIGHT

Table 1 Aluminium Pans for Thermal Efficiency Test

(Clauses [25.2](#) and [F-1.2](#))

Sl No.	Gas Rate at STP 1/h	Pan Diameter (External) mm ± 5 percent	Pan Height (External) mm ± 5 percent	Total Pan Mass with LID g ± 10 percent	Mass of Water in Pan kg
(1)	(2)	(3)	(4)	(5)	(6)
i)	Up to 40	180	100	356	2.0
ii)	41 to 50	205	110	451	2.8
iii)	51 to 60	220	120	519	3.7
iv)	61 to 70	245	130	632	4.8
v)	71 to 80	260	140	750	6.1
vi)	81 to 95	285	155	853	7.7
vii)	96 to 107	295	165	920	9.4

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.

4 Above 107 l/h, pans shall be specially constructed to conform, as far as possible, with the principles used in formulating this table.

ANNEX G

(Foreword)

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