IS 15333 (2004): Kero-Gas Stove [MED 26: Oil Burning Appliances]

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Indian Standard

KERO-GAS STOVE — SPECIFICATION

ICS 75.160.20, 97.040.20

BUREAU OF INDIAN STANDARDS
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Price Group 6

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Oil Burning Appliances Sectional Committee had been approved by the Mechanical Engineering Divisional Council.

Kero-gas stove is an oil (kerosene) pressure stove — Offset type and similar to LPG stove in appearance. It produces non-luminous, noise — less blue flame. They are of two types — Single burner and double burner (*see* Fig. 1 and 2). These stoves can be used as a substitute of LPG stoves in houses, when the gas is in short supply.

In the preparation of this standard, assistance has been derived from the following:

IS No.	*Title*
4246 : 2002	Domestic gas stoves for use with liquefied petroleum gases—Specification (*fifth revision*)
5116 : 1996	Domestic and commercial equipment for use with LPG — General requirements (*third revision*)
10109 : 2002	Oil pressure stoves — Offset burner type — Specification (*first revision*)

The composition of the Committee responsible for the preparation of this standard is given at Annex F.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

KERO-GAS STOVE — SPECIFICATION

1 SCOPE

1.1 This standard covers the requirements and tests for kero-gas stoves, intended for domestic use, burning pressurized kerosene oil vapours under a normal working pressure of 100 to 200 kN/m² (1 to 2 kgf/cm²).

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

Section 1	Construction
Section 2	Performance
Section 3	General

2 REFERENCES

The standards listed at 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 the 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.

3 TERMINOLOGY

For the purpose of this standard, the nomenclature of the different parts of the kero-gas stove shall be as indicated in Fig. 1.

4 CAPACITIES

The kero-gas stoves shall be made in different capacities of 2.0 to 4.0 litres nominal capacities in steps of 0.5 litre capacity. The capacities shall be measured by filling oil to the maximum through oil filler cap. The volume of oil that the fuel tank should hold in actual use should not be more than 94 percent of the capacity.

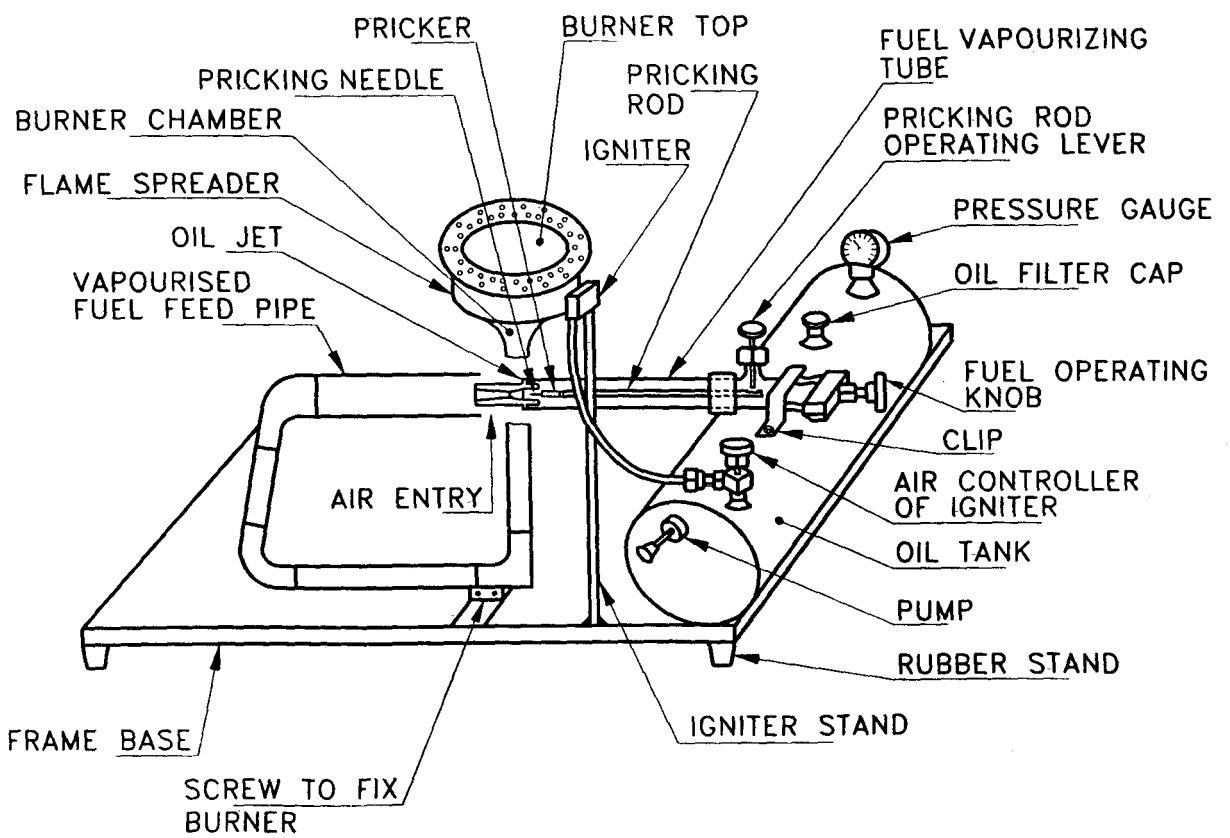


FIG. 1 KERO-GAS STOVE (SINGLE BURNER) (TYPICAL)

5 MATERIAL

5.1 Material used in the manufacture of different parts shall be such that they shall ensure safe handling and good performance of the stove throughout its reasonable life.

5.2 Fuel Container

The fuel container can either be rectangular, elliptical or cylindrical in shape. The fuel container shall be made either from seamless steel pipe welded or from one piece steel sheet or pipe or from pipe welded one piece steel sheet conforming to IS 513 or IS 1079. The rectangular tank can be made from steel sheet. The joints shall be welded.

5.2.1 The welding shall be sound and shall fully penetrate.

5.2.2 The minimum sheet thickness of the fuel container shall be 1.60 mm measured at any point.

5.3 Typical material that are commonly used in the manufacture of other components are given in Annex B.

6 SHAPE AND DIMENSIONS

6.1 Common shape of a kero-gas stove is shown in Fig. 1. It may be made in single burner (as shown in Fig. 1) or double burner design (as shown in Fig. 2).

6.2 The overall dimensions of fuel tank, the frame and stove shall be left at the option of the manufacturer. However, the kero-gas stoves so manufactured should satisfy all the performance requirements. The vessel when kept on the kero-gas stove shall not touch burner top.

SECTION 1 CONSTRUCTION

7 CONSTRUCTION

7.1 General

7.1.1 The frame of the kero-gas stove shall be so made as to be firm on its base. The base of the fuel container and body shall be at least 30 mm clear from the ground.

7.1.2 The kero-gas stove, both when full of fuel and when empty shall be capable of being tilted in any direction to an angle of 15° from the vertical, without overturning at that inclination or on being released.

7.1.3 The kero-gas stove shall be so designed that it remains stable and shall not be easily overturned.

7.2 Kerosene feed pipe and vaporization assembly with jet and pricking system (*see* Fig. 3)

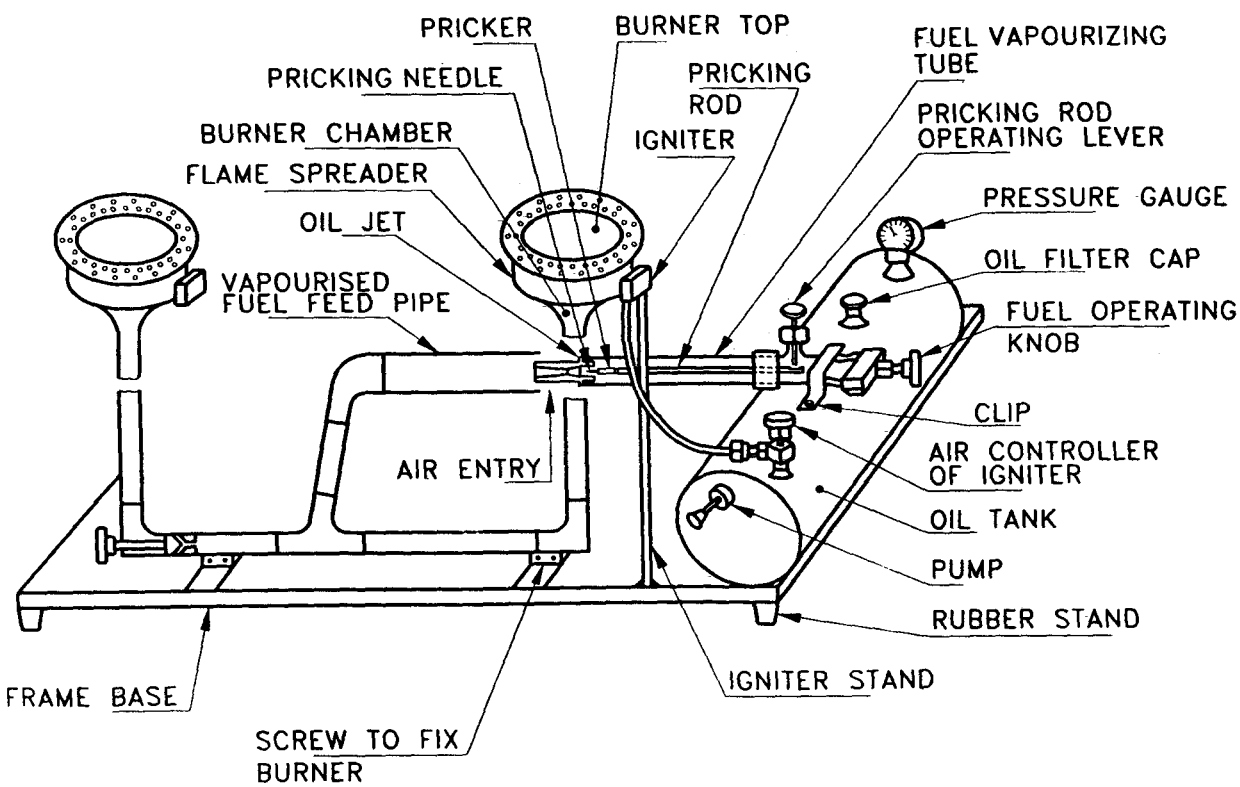


FIG. 2 KERO-GAS STOVE (DOUBLE BURNER) (TYPICAL)

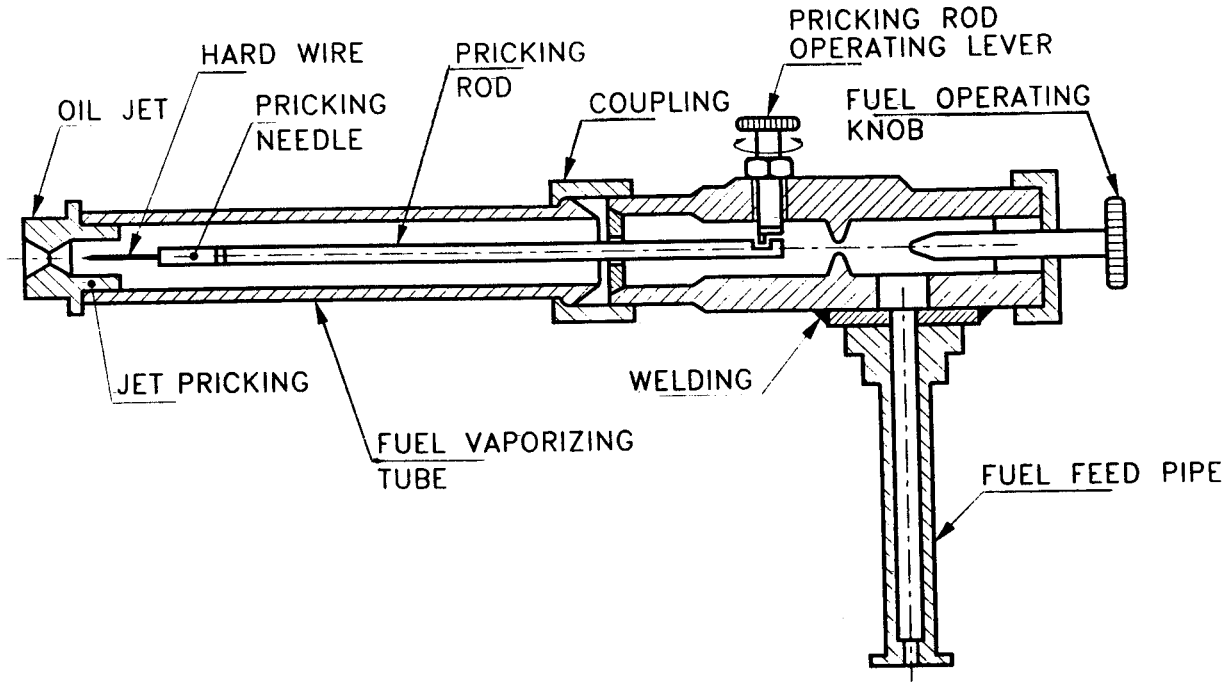


FIG. 3 FUEL (KEROSENE) FEED PIPE AND VAPORIZATION ASSEMBLY WITH JET AND PRICKING SYSTEM (TYPICAL)

The assembly with jet and pricking system is shown in Fig. 3. The fuel vaporizing tube and pricking needle shall be of stainless steel and hard steel wire respectively. The pricking rod operating lever knob and fuel-operating knob are of mild-steel. The rest parts of the assembly shall be of brass.

7.3 Air-Blowing System for Initial Preheating of Fuel Vapourizing Tube (*see* Fig. 4)

Air blowing system shows for initial preheating of the fuel vapourizing tube as shown in Fig. 4. The knob of air-blower, ignitor stand and supporting rod are of mild steel,

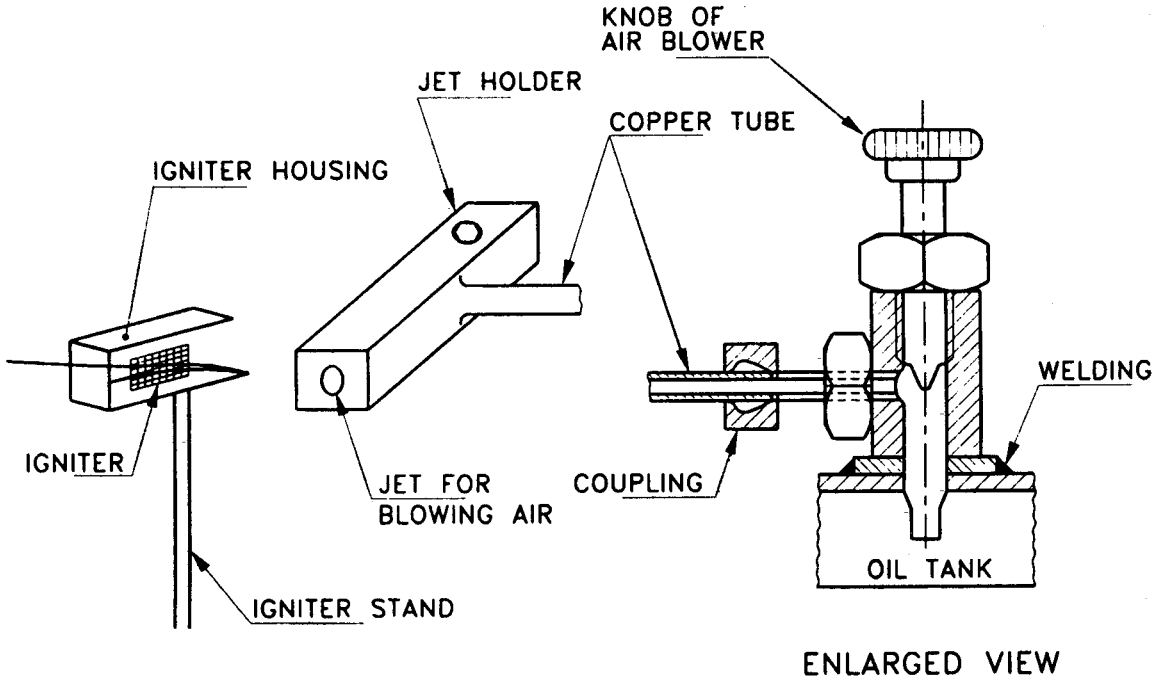


FIG. 4 AIR BLOWING SYSTEM (TYPICAL)

air line shall be of copper and rest remaining parts are of brass.

7.4 Pressure Gauge

A small 0-2.0 kgf/cm^2 range suitable pressure gauge shall be fitted at the top of oil tank.

7.5 Pump

The pump shall be of sound construction and shall be capable of developing and retaining a pressure of 250 kN/m^2 (2.5 kgf/cm^2). The pump washer and non-return valve shall be removable.

7.6 Washers

7.6.1 The washer for oil filler cap shall be made from neoprene or other equally suitable material which is resistant to heat and kerosene. It shall not become tacky or swollen when kept immersed in kerosene at 60°C for 24 h and shall be capable of giving leak-proof seal after the above test.

7.6.2 The pump washer shall be made from curried buffalo leather or other equally suitable material and shall be treated to avoid hardening and cracking.

7.6.3 The washer between kerosene feed pipe and vaporization assembly and oil tank shall be of lead, and 3 mm thick.

7.7 Pricker

The pricker shall have a hard steel wire of diamete 0.05 mm less than the diameter of the jet (nozzle) and is fixed in a brass — attachment, fitted to the pricking rod of brass.

7.8 Interchangeable Parts

The following parts shall be interchangeable in the same type and capacity of the stove:

a) Burner chamber,
b) Burner top,
c) Flame spreader,
d) Jet (nozzle),
e) Oil filling cap,
f) Fuel operating knob,
g) Pressure gauge,
h) Pump valve,
j) Pump washer,
k) Pump cap, and
m) Air control knob.

8 DESIGN FOR MAINTENANCE

8.1 The appliance, including all the component parts, shall be easy to clean and maintain in good working order. There shall be easy access to the accessories and controls for maintenance and adjustment.

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

8.3 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.

8.4 The parts of the burner shall not become disconnected during operation of the appliance. The burners should be so spaced that the distance between the centres of the burners shall not be less than 180 mm (in case of double burner kero-gas stove).

8.5 Burner ports shall be so designed and located that in normal use spillage of food shall not cause internal fouling of burner chamber or vapourized fuel feed pipe.

9 WORKMANSHIP AND FINISH

9.1 The surface shall show no defects when visually examined for pin-holes, blisters, roughness and exposed areas of metal which would give rise to rapid deterioration in use.

9.2 All steel parts shall be painted by a heat-resistant paint. The painted surface shall not chip or peeled off during use.

9.3 Vitreous enamelled parts shall comply with the requirements of IS 3972.

9.4 Nickel/Chromium plating of parts shall be according to IS 1068 or IS 4827.

9.5 The finish of exposed parts shall be durable and easily cleaned. Parts that will come in contact with foodstuffs be capable of being hygienically cleaned.

10 GENERAL DESCRIPTION

The kero-gas stove (*see* Fig. 1 and 2) has following components:

a) An oil tank (or fuel container) with four outlets at the top for : (1) fuel feeding, (2) pressure gauge, (3) fuel supply to the fuel vapourizing tube, (4) air blowing, and (5) one outlet for oil pump in the front upper side of fuel-container.
b) Fuel vapourizing tube, having jet (nozzle) at one end, jet (nozzle) pricking rod attached with a lever moved to and fro with one knob and one fuel 'OFF/ON' knob. This fuel supply assembly is connected with another pipe which goes into fuel container nearly upto bottom of the container.
c) 'J' shaped pipe (mixing tube) consists of fuel vapourizing tube through which vapourized fuel passes. Fuel vapourizing tube having jet (nozzle) at its end.

d) The other long end of J-shaped pipe (mixing tube) is attached to the burner chamber, which has flame spreader and burner head having perforations (ports) at the top.
e) One copper tube fitted to a jet used for blowing air for pre-heating and is controlled by another knob fitted on the top of fuel container. The jet is kept on a support fixed to the frame of the kero-gas stove. The asbestos ignitor wrapped in a wire gauge soaked in kerosene is kept on this support for initial preheating.
f) Pan supports shall be made of chrome/nickel plated or stainless steel body.
g) A frame to support the whole assembly.

11 TEST FUEL

Kerosene conforming to IS 1459 shall be used.

12 WORKING OF KERO-GAS STOVE

The filtered kerosene is filled to three-fourth capacity of oil tank. A pressure gauge of range up to 2.0 kgf/cm^2 is fitted. Close oil cap and inlet of fuel vaporizing tube. Air is pumped upto 1.4 kgf/cm^2 pressure. Igniter soaked in kerosene is lighted and kept in position and air-blowing knob is opened. The flame produced is directed towards the fuel vapourizing tube at the top of burner head. After 5 min or when the fuel vapourizing tube is heated sufficiently to vapourize kerosene, the oil inlet of the fuel vapourizing tube is opened. The kerosene vapours comes out through the jet (nozzle) and pass through J-shaped mixing tube to burner chamber after pre-mixing with entrained air. From burner chamber this air-fuel vapour mixture comes out through burner ports provided at the burner top. These vapours catch fire by flame blown through ignitor. Pricking of the jet (nozzle) is done as and when required (but not during tests) to get a stable blue flame. The air blowing knob is closed and ignitor removed and put-off. The kero-gas stove is allowed to burn for 15 minutes. Constant pressure is maintained at 1.4 kgf/cm^2. Now it is ready for test.

SECTION 2 PERFORMANCE

13 GENERAL CONDITIONS OF TEST

13.1 Kero-gas stove shall be tested under conditions simulating as closely as possible to those under which it is designed to operate. During the tests initial adjustment of kero-gas stove shall not be altered. The appliance shall be adjusted and operated in accordance with the instructions given on or issued with the kero-gas stove. Before any tests are made the kero-gas stove shall be operated for a sufficient period to remove any temporary blockage, which might interfere with observations. The stove shall be allowed to burn for 10 min at the specified working pressure during which a blued flame shall be obtained. The system shall be examined for leaks before and after test. The performance results shall not be valid unless the system is sound. The kero-gas stove shall be at room temperature at the start of each test.

13.2 The room in which tests are conducted shall be adequately ventilated but free from perceptible draughts.

13.3 The initial temperature of the room shall be between 25°C and 30°C. The water temperature shall be within ± 2°C of the room temperature.

14 FUEL CONSUMPTION

The kero-gas stove under test shall be lighted as stated in **12**. After burning for 15 min the lighted stove shall be weighed on a sensitive balance with an accuracy of 1 g. The kero-gas stove shall be allowed to burn for 1 h with an aluminium pan having sufficient water in it. At the end of 1h, weight of the burning kero-gas stove shall be noted after removing the aluminium pan. The difference in the initial and final weight of the burning kero-gas stove shall give the fuel consumption rate in grams per hour.

In case of double burner kero-gas stove, one burner is lighted at a time for fuel consumption as it is not possible to light other burner as per design of the kero-gas stove. Hence fuel consumption can not be determined separately for each burner.

15 FLAME TRAVEL AND FLAME STABILITY

Flame travel shall be complete, when the kero-gas stove is lighted. The flame shall be stable and blue, without extinguishing, blowing off or striking back and without formation of soot.

16 NOISE CONTROL

The lighting of kero-gas stove, its operation and turning off shall not give rise to under or excessive noise during operation.

17 FORMATION OF SOOT

A pan, 200 mm diameter, full of water, shall be placed on the top of the burner of lighted kero-gas stove at 140 kN/m^2 (or 1.4 kgf/cm^2) for 1 h. Soot (unburnt carbon) shall not be deposited on the burner top or on the bottom of the pan.

18 RESISTANCE TO DRAUGHT

On placing the lighted kero-gas stove in a normal (not localized) current of air with a velocity of 2 m/s, as measured with a rotating vane anemometer, the flame shall not extinguish.

19 PRESSURE TESTS

19.1 Air Pressure Test

Each fuel container fitted with pump valve, fuel vapourizing assembly, air blowing system and oil cap, shall with stand an internal air pressure of 250 kN/m² (2.5 kgf/cm²) and shall not show any sign of leakage or deformation.

19.2 Safety Pressure Test

The container only without any other fittings shall be subjected to an internal hydraulic pressure of 1 000 kN/m² (10 kgf/cm²) for a period of 5 min. The container shall not show any sign of leakage or appreciable deformation.

19.3 Bursting Pressure Test

When the container selected in **19.2** is further subjected to a hydraulic pressure of 1 400 kN/m² (14 kgf/cm²), it shall neither burst nor unduly distort. Slight leakage of the hydraulic fluid shall be permissible, provided the pressure is capable of being maintained for duration of not less than 5 min.

20 FUEL CREEP

When operated under normal conditions with the fuel container filled to its three-fourth capacity, there shall be no spreading of fuel over any part of the appliance so as to cause undesirable odour or any increase or disturbance in flame size.

21 SURFACE TEMPERATURE AND FUEL TEMPERATURE

The surface temperature of any part of the kero-gas stove that may be necessary to touch during its operation as well as the maximum fuel temperature attained during three hours continuous operation of the stove shall not exceed 60°C when measured in accordance with method prescribed in Annex C.

22 COMBUSTION EFFICIENCY

When tested in accordance with the details laid down in Annex D, the carbon monoxide/carbon dioxide ratio of the exhaust gases of each burner, while burning with blue flame, shall not exceed 0.02.

23 THERMAL EFFICIENCY

When tested in accordance with the method described in Annex E, the thermal efficiency of kero-gas stove for each burner shall be not less than 64 percent.

SECTION 3 GENERAL

24 INSTRUCTIONS

Each stove shall be accompanied by an instruction sheet, card in Hindi, English and other regional language giving the following information:

a) Brief instructions for installation and regulation which include piping and fittings, if any;
b) Instruction for correct and safe operation of the appliance;
c) Use filtered kerosene and fill the kerosene in the container, not exceeding three-fourth capacity of the fuel container;
d) Maximum kerosene consumption rate in kg/h at 140 kN/m² (1.4 kgf/cm²);
e) Total oil filling capacity, in litres;
f) Expected thermal efficiency; and
g) Country of origin.

25 MARKING

25.1 A metallic plate incorporating the following shall be securely fixed to each kero-gas stove:

a) Manufacturer's name and address, initials or any registered trade-mark;
b) Any special instructions for safe use of the appliance; and
c) Country of origin.

25.2 BIS Certification Marking

25.2.1 The kero-gas stoves may also be marked with the BIS Standard Mark

25.2.2 The use of the Standard Mark is governed by the provisions of *Bureau of Indian Standards Act*, 1986 and the Rules and Regulations made there under. The details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers, may be obtained from the Bureau of Indian Standards.

26 PACKING

The kero-gas stove shall be packed as agreed to between the purchaser and the supplier, taking care of safety requirements such as duration handling and transit to protect against damage. Each stove shall be packed in cardboard box together with instruction card and following accessories:

a) Pump washer (one);
b) Fuel vapourizing tube assembly's lead washer (one);
c) Funnel with filter (one);
d) Flame spreader (one);
e) Jet (nozzle) (two);
f) Air blower jet (nozzle) (two); and
g) Adjustable spanner (one).

ANNEX A
(*Clause* 2)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*	*IS No.*	*Title*
280 : 1978	Specification for mild steel wire for general engineering purposes (*third revision*)	1239 (Part 1) : 1990	Mild steel tubes, tubulars and other wrought steel fittings : Part 1 Mild steel tubes (*fifth revision*)
319 : 1989	Free cutting leaded brass bars, rods and sections — Specification (*fourth revision*)	1459 : 1974	Specification for kerosene (*second revision*)
513 : 1994	Cold rolled carbon steel sheets and strips (*fourth revision*)	2062 : 1999	Steel for general structural purposes — Specification (*fifth revision*)
1068 : 1993	Electroplated coatings of nickel plus chromium and copper plus nickel plus chromium (*third revision*)	3972 : 1968	Method of test for vitreous enamelware
1079 : 1994	Hot rolled carbon steel sheet and strips —Specification (*fifth revision*)	4287 : 1992	Starch — Glossary (*second revision*)
		4827 : 1983	Electroplated coatings of copper, nickel and chromium on zinc and zinc alloys (*first revision*)
		6527 : 1995	Stainless steel wire rod (*first revision*)

ANNEX B
(*Clause* 5.3)

MATERIALS COMMONLY USED IN THE MANUFACTURE OF COMPONENTS OF KERO-GAS STOVES, OTHER THAN THOSE SPECIFIED IN 5.2

Sl No.	*Component*	*Material*	*Recommended IS No.*
i)	Vapourized fuel feed pipe	ERW mild steel tube, minimum thickness 1.0 mm	IS 1239 (Part 1)
ii)	Frame base	Mild steel angle/slotted angle iron	—
iii)	Rubber stand	Rubber	—
iv)	Pump tube	Mild steel tube	IS 1239 (Part 1)
v)	Pump piston	Brass rod	IS 319
vi)	Pump valve body	Brass rod	IS 319
vii)	Pump rod, nut and washer	Brass rod or mild steel rod or stainless steel rod	IS 319 or IS 2062 or IS 6527
viii)	Pump valve screw	Brass rod or mild steel wire	IS 319 or IS 280
ix)	Pump cap	Mild steel rod	IS 2062
x)	Air controls of ignition	Brass rod	IS 319
xi)	Ignition jet	Brass rod	IS 319
xii)	Air tube for ignition	Copper	—
xiii)	Cap of air control for ignition/Air controller	Mild steel	—

(*Continued on page* 8)

(Continued from page 7)

Sl No.	Component	Material	Recommended IS No.
xiv)	Oil filter cap	Mild steel	IS 2062
xv)	Igniter stand	Mild steel rod	IS 2062
xvi)	Burner chamber	Cast iron	—
xvii)	Flame spreader	Mild steel	IS 2062
xviii)	Burner top	Brass	IS 319
xix)	Oil jet	Brass	IS 319
xx)	Fuel vapourizing tube	Stainless steel	—
xxi)	Pricker	Brass	IS 319
xxii)	Pricking needle	Stainless steel wire (hard)	—
xxiii)	Pricking rod	Brass	IS 319
xxiv)	Pricking rod operating lever	Brass	IS 319
xxv)	Fuel operating rod	Brass	IS 319
xxvi)	Fuel operating rod knob	Mild steel	IS 2062
xxvii)	Clip	Mild steel	IS 2062
xxviii)	Body	Mild steel or stainless steel	—
xxix)	Pan support	Cast iron	IS 319
xxx)	Fuel feed pipe	Brass	IS 319

ANNEX C
(*Clause* 21)

METHOD OF MEASUREMENT OF SURFACE TEMPERATURE

C-1 PREPARATION OF STOVE

The stove shall be tested with the fuel container containing approximately 75 percent of the amount of fuel, which it would hold when full. The stove shall be lighted and run at the full output 1.4 to 2.0 kgf/cm^2 for 1h (at a working pressure of 140 to 200 kN/m^2). A pan containing water shall be placed over it. Before starting the measurement the pan shall be removed.

C-2 PROCEDURE

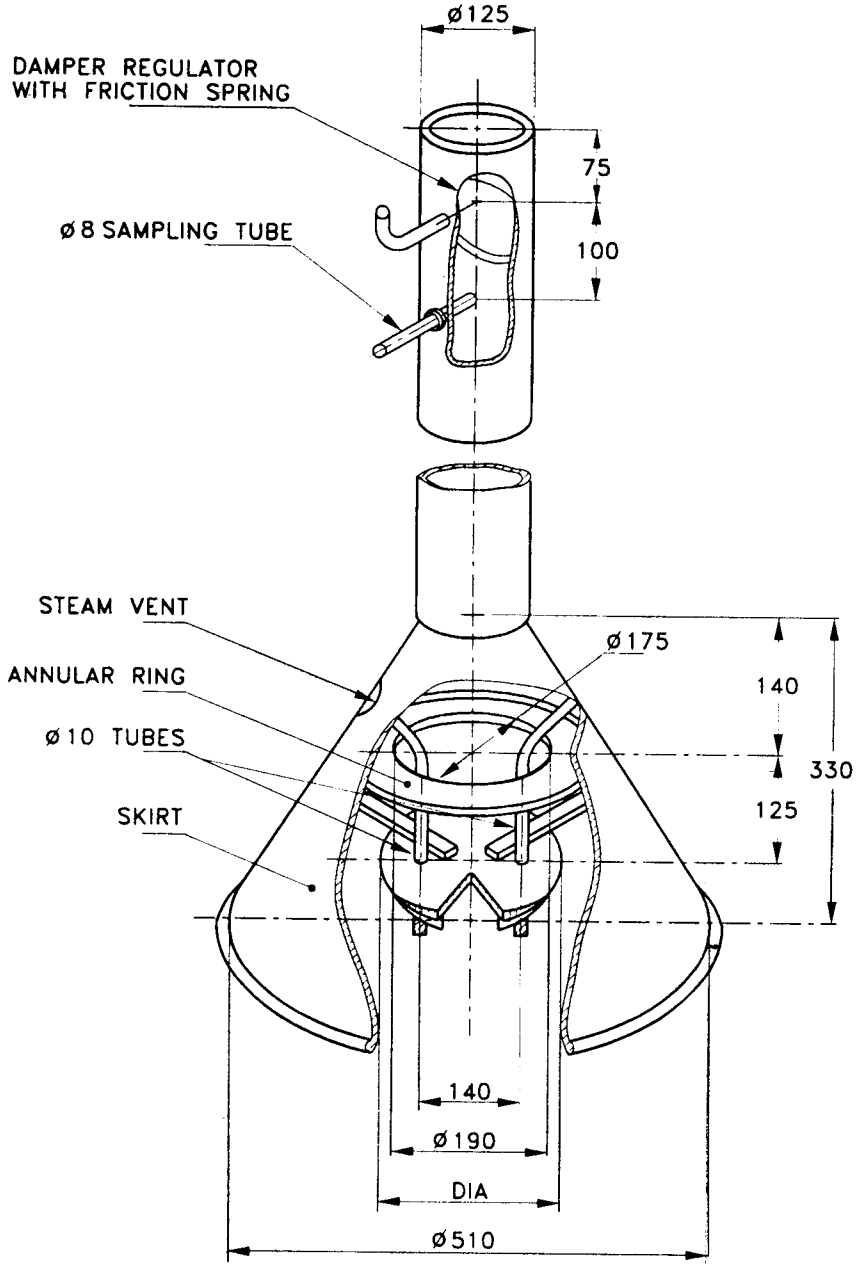
The temperature of all parts of the stove which may be necessary to touch during its operation shall be measured by using a mercury bulb thermometer. The temperature of each such part shall be measured thrice every 30 minutes to get three concordant readings. While measuring the temperature, the thermometer shall be covered with a felt pad and kept in contact with that part for sufficient period of time until maximum temperature is reached.

ANNEX D
(*Clause* 22)

TEST FOR COMBUSTION EFFICIENCY

D-1 EQUIPMENT

D-1.1 The stove shall be tested with its fuel container filled with kerosene to nearly three-fourths of its capacity. Before starting the test, a pan of the type and size as described in **E-3.1** and containing water sufficient for the test shall be placed over the burner. In addition, a collecting hood (*see* Fig. 5) suitable for stove under examination shall be used.



All dimensions in millimetres.

FIG. 5 HOOD FOR BURNER

D-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 gases. Also it shall be such that the sample collected represents the whole of combustion gases and not those from one particular point. When using hood, the damper provided shall be set, or an additional flue pipe added, so that spillage of the flue gases around the skirt is minimized.

D-2 PROCEDURE

D-2.1 With the hood in position a collecting hood suitable for the stove under examination shall be obtained. The hood shall be so designed that while not interfering in any way with the normal combustion of the stove, 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 on particular point. When using 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 stove under investigation.

D-2.2 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, Drager 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.

D-2.3 Each burner shall be tested separately. The carbon monoxide and carbon dioxide contents of the product of combustion shall be determined by the methods capable of an accuracy of 0.001 percent and 0.05 percent respectively, of the volume of the sample.

ANNEX E
(Clause 23)

TEST FOR THERMAL EFFICIENCY

E-1 THERMAL EFFICIENCY

Thermal efficiency of kero-gas stove is defined as the ratio of heat actually utilized to the heat theoretically produced by complete combustion of a given quantity of fuel (which is based on net calorific value of the fuel).

E-2 SETTING OF THE KERO-GAS STOVE

The kero-gas stove whose efficiency is to be determined shall be lighted as stated in **12.**

E-3 METHOD OF TEST

E-3.1 The consumption rate of the kero-gas stove is determined first. Then the aluminium pan is selected from Table 1 and filled with required quantity of distilled water.

E-3.2 The lid of the aluminium shall have two holes, one for inserting the rubber cork for holding a test quality mercury thermometer at the centre and the other for the stirrer (made of aluminium wire) required for stirring the water. The bulb of the thermometer should be dipped nearly to half of the water level. The free end of the stirrer shall come out of the lid.

E-3.3 The kero-gas stove shall be lighted at an average working pressure of 140 kN/mm^2 (1.4 kgf/cm^2). After 5 min, weight of the stove, time and initial temperature of water in the pan shall be noted. The pan is covered with the lid. Start the stop watch immediately after weighing.

E-3.4 The aluminium pan shall be placed on the kero-gas stove after initial weighing of the stove and second stopwatch started immediately. Stirring shall be done gently during heating upto 95°C (or 5°C below the boiling point) and as the temperature reaches, the second stopwatch shall be stoped.

The kero-gas stove shall be weighted again after 1 h of its previous weighing.

E- 4 The thermal efficiency shall be calculated by the following formula :

$$\text{Thermal efficiency } (\%e) = \frac{\text{Heat utilize}}{\text{Heat produced}} \times 100$$

$$= \frac{\begin{matrix}\text{Heat gained by} \\ \text{(pan + lid + stirrer)}\end{matrix} + \begin{matrix}\text{Heat utilized by} \\ \text{Water in the pan}\end{matrix}}{\text{Heat produce by fuel}} \times 100$$

where

e = thermal efficiency of the burner in percent,

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

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

[weight of pan complete with lid and stirrer in kg and specific heat of aluminium = 0.214],

t_2 = final temperature of water, in °C,

t = initial temperature of water, in °C,

M = weight of fuel consumed in 1 h, in kg, and

K = calorific value of the kerosine, in kcal/kg = 10 500 kcal/kg.

E-5 In performing the thermal efficiency test the following points shall be noted:

a) 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) Room shall be free from draught.

c) 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) 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 kero-gas stove and kerosene shall be at room temperature.

f) Temperature of the water shall be measured by means of a mercury-in-glass thermometer of accuracy of 0.5° C the bulb of which is immersed to half the depth of the water in vessel.

g) Stirring shall be affected by means of a horizontal loop of 3 mm aluminium rod attached to an upright, which passes through a 6 mm, hole drilled in lid.

h) Accuracy of weighing balance used shall be of 0.1 g for consumption measurement and 1 g for the other weights.

j) Specific heat of aluminium is 0.214.

Table 1 Aluminium Pans for Thermal Efficiency Test

(*Clause* E-3.1)

Sl No.	Fuel Consumption Rate g/h	Vessel Diameter (External) mm (+5%)	Vessel Height (External) mm (+5%)	Total Weight with Lid g (+20%)	Weight Water in Vessel kg
(1)	(2)	(3)	(4)	(5)	(6)
i)	151-180	245	130	632	4.8
ii)	181-210	260	140	750	6.1
iii)	211-240	285	155	853	7.7
iv)	241-270	295	165	920	9.4
v)	271-300	320	175	1 100	11.4
vi)	301-330	340	185	1 200	12.5
vii)	331-360	350	195	1 310	14.00
viii)	361-390	370	200	1 420	16.00
ix)	391-420	380	210	1 530	18.00
x)	421-450	400	215	1 640	20.00
xi)	451-480	410	225	1 750	22.00
xii)	481-510	420	230	1 860	24.00
xiii)	511-540	435	240	2 000	26.50
xiv)	541-570	450	245	2 130	29.00
xv)	571-600	460	250	2 240	31.00
xvi)	601-630	470	255	2 320	33.00
xvii)	631-660	480	260	2 440	35.00
xviii)	661-700	490	265	2 520	38.00
xix)	701-750	500	270	2 650	41.00
xx)	751-800	510	275	2 720	44.00
xxi)	801-850	530	280	3 050	47.00
xxii)	851-900	540	285	3 190	50.00
xxiii)	901-950	550	290	3 330	53.00

ANNEX F
(*Foreword*)

COMMITTEE COMPOSITION

Composition of Oil Burning Appliances Sectional Committee, ME 26

Organization	*Representative(s)*
Petroleum Conservation Research Association, New Delhi	SHRI U. P. SINGH (***Chairman***) SHRI PARAMJIT SINGH (*Alternate*)
Ashok Iron & Steel Fabricators Pvt Ltd, Rajkot	SHRI H. V. BARCHHA SHRI VINODRAI V. VARCHHA (*Alternate*)
Consumer Guidance Society of India (Regd), Mumbai	SHRI G. S. ABHYANKAR SHRIMATI RENU TALWANI (*Alternate*)
Darshna Udyog, Rajkot	SHRI M. VINODRAI V. BARCHHA SHRI RAM K. H. BARCHHA (*Alternate*)
Indian Institute of Petroleum, Dehra Dun	SHRI H. K. MADAN SHRI K. N. DOBHAL (*Alternate*)
Indian Oil Corporation Ltd, Mumbai	SHRI S. P. DUBEY SHRI R. K. PAULASTYA (*Alternate*)
International Burner Manufacturing Co, Mumbai	SHRI M. J. KANSARA SHRI D. M. KANSARA (*Alternate*)
Ministry of Defence (DGQA), New Delhi	LT COL J. S. DUGGAL SHRI R. P. BHATNAGAR (*Alternate*)
Office of the Development Commissioner (SSI), New Delhi	SHRI M. K. BHAT SHRI V. D. NARANG (*Alternate*)
Premier Industrial Corporation, Coimbatore	SHRI R. SHYAM SUNDER SHRI R. SIVA KUMAR (*Alternate*)
The Bombay Light & Stove Merchant's Association, Mumbai	SHRI MAHESH D BAKHAI SHRI G. Y. KAPASI (*Alternate*)
The South India Kerosene Wick Stove Manufacturers Association, Madurai	SHRI C. KASI SHRI T. CHIDAMBARAM (*Alternate*)
BIS Directorate General	SHRI M. L. CHOPRA, Director & Head (MED) [Representing Director General (*Ex-officio*)]

Member Secretary
SHRI S. B. ROY
Director (MED), BIS

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