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सुवाह्य गैस साधित्र — सामान्य विनिर्देश और परीक्षण विधियाँ

Draft *Indian Standard*

PORTABLE GAS APPLIANCES — GENERAL SPECIFICATIONS AND TEST METHODS

ICS 75.160.30; 97.040.20

Domestic and Commercial Gas Burning Appliances Sectional Committee, MED 23	Last date for comments: **24 August 2025**

FOREWORD

(*Formal clause to be added later*)

It must be noted that only gas cartridges conforming to this standard, i.e., 'Specification for LP gas and non-refillable gas cartridges for portable gas appliances' shall be used as the only fuel source. These appliances are not meant for, and should not be modified for connection to piped-in town gas or LPG cartridges.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, IS 2 : 2022 'Rules for rounding of numerical values (*second revision*)'. The number of significant places retained in the rounded of value should be same as that of the specified value in this standard.

Draft *Indian Standard*

PORTABLE GAS APPLIANCES — GENERAL SPECIFICATIONS AND TEST METHODS

1 SCOPE

This Standard specifies the portable cooking appliances used with a cartridge filled with liquefied petroleum gas (LPG) which is built into the appliance either as one of its components or as an accessory to it.

2 REFERENCES

The standards listed below contain provisions which through reference in this text, constitute provision 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 edition of these standards.

IS No.	*Title*
IEC 60730-2-9 : 2015	Automatic electrical controls - Part 2-9: Particular requirements for temperature sensing controls
ISO 9227 : 2022	Corrosion tests in artificial atmospheres — Salt spray tests
ISO 3290-1 : 2014	Rolling bearings — Balls Part 1: Steel balls
MED 16 (25978)	Light Gauge Metal Containers Non-Refillable LPG Cartridges — General Requirements

3 TERMS AND DEFINITIONS

3.1 Portable Gas Cooker/ Portable Gas Stove

Cooking appliance provided with a pan support on its top surface, on which a cooking container can be placed for boiling food or other cooking operations (*see* Figure 9).

3.2 Portable Griller

Appliance comprising a net on which food is cooked either directly by open fire or by radiant heat from a radiant plate heated red hot by burner flame (*see* Figure 10).

3.3 Portable Hot Plate Cooker

Appliance comprising a plate which, by being heated over open fire, mainly provides the conductive heat to cook food (*see* Figure 11).

3.4 Water Receiver

Tray used in a hot plate cooker or other appliances for receiving cooking juice from the food being cooked.

3.5 Net

Metallic mesh provided on a griller on which food can be placed for cooking.

3.6 Iron Plate

Plate provided on a hot plate cooker on which food can be placed for cooking.

3.7 Cartridge

Non-refillable LPG cartridge is specified in Doc: MED 16 (25978).

3.8 Normal Service Conditions

Conditions under which a cooker is safe for use. The conditions are recommended by the manufacturer and printed in the operational manual.

3.9 Specimen

Piece of material dismantled (or cut out in part or whole) from the cooker and used for testing its conformance against the requirements set out in this standard. It is used for only one test unless otherwise stated. However, if a specific size (or amount) of the material cannot be removed from the cooker, the specimen may be provided by the manufacturer.

4 PERFORMANCE

The appliances, when tested by the methods specified in clause 7, shall satisfy the performance requirements in Table 1.

Table 1 Performance
(*Clause* 4)

Sl. No.	**Item**	**Requirement**		**Applicable test Subclause**
i)	Gas tightness of gas passage	Cartridge-appliance joint	There shall be no leakage under the pressure of 0.9 MPa. For appliances equipped with a pressure sensitive safety device designed so that the cartridge coupled with the appliance can be decoupled, there shall be no leakage under any pressure below the safety device activating pressure.	**7.4**

			From the cartridge-appliance joint to governor high-pressure side	There shall be no leakage under the pressure of 0.9 MPa.	
			From the governor low-pressure side to the appliance valve	There shall be no leakage under normal operation pressure.	
			From appliance valve to flame port		
ii)	Pressure resistance of gas passage		There shall be no leakage, or deformation or breakage detrimental to the use of the appliance.		**7.5**
iii)	Combustion	Normal service condition	Ignition shall be secure, and there shall be no explosive ignition a). Ignition at all flame ports shall be achieved within 4 s.		**7.7.1**
			There shall be no flame lifting b).		
			There shall be no unintended flame extinction c).		
			The flames shall be uniform.		
			There shall be no backfire d).		
			Continuous noise shall not exceed 60 dB.		
			There shall be no explosive noise at flame extinction.		
			The theoretical carbon monoxide (CO) concentration in dry combustion gas (vol %) (hereafter referred to as CO %) shall be 0.14 % max.		
			There shall be no generation of soot e).		
			The yellow flame shall not be constantly in contact with the electrode part f).		
		Service condition of oversize pot	There shall be no flickering of flame, fogginess or irritating odour.		**7.7.2**
iv)	Flame-extinction performance		Flames of all the ports shall be extinguished within 4s after the closing of the appliance valve.		**7.8**
v)	Temperature rise g)	During normal use	Surface of dry cell	55 °C max.	**7.9.1** or **7.18** (In the case of heat resistance test)
			Surfaces to be touched by hand at operation (knobs etc.)	Metallic parts 60 °C max.	
				Other parts 70 °C max.	
			Surfaces that are possibly touched by hand at operation (excluding knobs etc.)	140 °C max.	
			Surface of gas-passing part of the appliance valve body.	Not exceeding 85 °C or the temperature up to which no gas leakage or abnormalities in operation have been confirmed in the heat resistance test h).	
			Surface of valves used for gas-passing parts		
			Surface of ignition unit	Not exceeding 85 °C or the temperature up to which conformity	

				to the electric ignition performance requirement has been confirmed and no deformation or discolouration has been observed in the heat resistance test h).	
			Surface of gas-passing part of governor	Not exceeding 70 °C or the temperature up to which no gas leakage or change in regulating pressure exceeding 8 % has been confirmed in the heat resistance test.	
			Wooden wall surfaces corresponding to rear and side surfaces of the appliance and wooden base underneath the appliance	100 °C max. for all surfaces	
		During use of oversize pot	Wooden wall surfaces corresponding to rear and side surfaces of the appliance and wooden base underneath the appliance	135 °C max. for all surfaces	**7.9.2**
vi)	Electrical ignition		Ignition shall successfully occur at least 8 out of 10 times, without consecutive non-ignitions. There shall be no explosive ignition i).		**7.10**
vii)	Pressure inside the cartridge		It shall not exceed 0.4 MPa.		**7.11**
viii)	Activation performance of safety devices	Pressure sensitive safety device	The device shall activate in the range of 0.4 MPa to 0.6 MPa. If the device is designed to shut off the gas passage upon activation, no change of pressure in the high pressure part after gas shut-off shall cause the gas passage to automatically reopen and resume feeding of gas.		**7.12**
		Flame supervision device (applicable to appliances equipped with the flame supervision device)	Those designed to shut-off the gas passage automatically at the time of non-ignition or unintended flame extinction.	The valve shall open within 10 s of ignition.	**7.13**
				The valve shall shut-off within 60 s of flame extinction.	
				The valve shall shut-off within 60 s of non-ignition.	
		Overheat prevention device (applicable to appliances	The device shall activate before the appliance reaches the temperature specified by the manufacturer, and when the appliance has cooled down to a normal temperature, the gas passage shall not automatically reopen.		**7.14**

		equipped with the overheat prevention device)				
ix)	Repeated use		Appliance valve		12 000 times	There shall be no gas leakage or defects detrimental to the use of the appliance j).	**7.15 a)**
			Electric ignition device		12 000 times	The electric ignition performance requirement shall be satisfies, and there shall be no defects detrimental to the use of the appliance.	**7.15 b)**
			Governor	At normal pressure (0.2 MPa)	30 000 times	There shall be no gas leakage or change in regulating pressure exceeding 8 %.	**7.15 c)**
				At high pressure (safety device activating pressure)	1 000 times	There shall be no gas leakage or change in regulating pressure exceeding 8 %.	
			Pressure sensitive safety device		1 000 times	There shall be no gas leakage k), and the activation performance requirement of pressure sensitive safety device shall be satisfied.	**7.15 d)**
			Cartridge-appliance joint		6 000 times	The requirement for gas tightness of gas passage shall be satisfied.	**7.15 e)**
			Flame supervision device (applicable to appliances equipped with the flame supervision device)		1 000 times	There shall be no gas leakage and the activation performance requirement of flame supervision device shall be satisfied.	**7.15 f)**
x)	Practical performance of appliance		The thermal efficiency shall not be less than 40 %.				**7.17**

NOTES —
1. "No explosive ignition" means that the noise generated at ignition does not exceed 85 dB.
2. "No flame lifting" means that, at 15 s after the ignition, the number of flames which depart from the flame port is not more than one-third of the flame ports in each burner corresponding to the nozzle.

3. "No unintended flame extinction" means that, at 15 s after the ignition, there shall be no flame flickering out in each burner corresponding to the nozzle.
4. "No backfire" means that, during 30 min after the ignition, there shall be no flame burning inside the burner and no flame extinction due to a backfire.
5. "No soot generation" means that, during 30 min after the ignition, excluding the moment of ignition, the bottoms of the containers placed on the appliance such as a pot, net, iron plate, etc. as well as the surface of the radiation plate are free from soot deposition.
6. "The electrode part shall not be constantly in contact with yellow flame" means that, when the burner is burnt for 15 min with a pot or the like to be used being placed on the appliance, the yellow flame shall not be in contact with the electrode for more than 30 s continuously per minute.
7. The standard ambient temperature during the temperature-rise test shall be 35 °C.
8. "No abnormalities in operation" means that there is no problem in operation of the appliance valve or in opening and closing of the valve.
9. "There shall be no explosive ignition" means that the noise generated at ignition shall not exceed 85 dB.
10. "Defects detrimental to the use of the appliance" means such defects as where the appliance valve becomes stuck and unrotatable, or broken.
11. "No gas leakage" means that the amount of air leaking through the valve of the safety device does not exceed 0.55 L/h.

5 CONSTRUCTION

5.1 General

The appliance and each part thereof shall be manufactured with consideration for durability to gas leakage, fire accident or the like, shall be of such a construction as with standing normal transportation, installation and use without breakage or deformation detrimental to the use of the appliance.

a) The connection of a cartridge to the appliance shall not be achieved other than by moving[1)] the cartridge valve in its axial direction.

NOTE[1)] — "To move the cartridge valve in its axis direction" means that the cartridge is moved in the direction as shown in Figure 1.

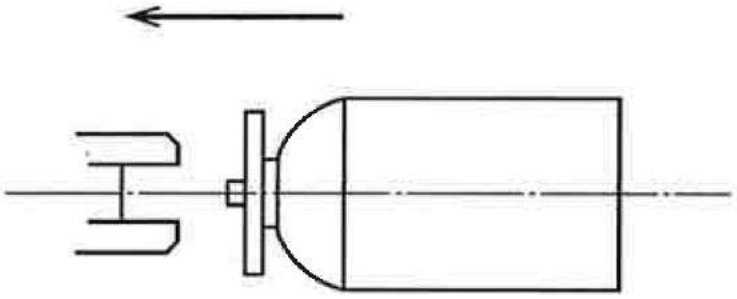


FIGURE 1 MOVING THE CARTRIDGE VALVE IN ITS AXIAL DIRECTION

b) A spring shall not be used directly for joining the cartridge to the appliance.

c) This does not apply to those springs which are used for absorbing a dimensional error.

d) The appliance shall be structured not to allow placement of a spare cartridge under normal service condition.

e) An appliance that allows the cartridge to be placed under stationary condition and causes it to drop under raised condition is not considered as satisfying this requirement.

f) Connecting the cartridge to the appliance shall be possible only when the appliance valve is closed.

g) The appliance shall be structured so that the cartridge compartment is free from accumulation of gas[2)].

NOTE[2)] —To be "structured so that the cartridge compartment is free from accumulation of gas" means that the appliance is provided with a vent hole in the side or lower face of the cartridge compartment, as well as that the lower face of the cartridge compartment is not in contact with the floor surface.

h) The appliance shall be provided with a governor.

j) When tested in accordance with **7.2.4, 7.4** and **7.7**, the appliance shall withstand impact and vibration that it may undergo during use or transportation without loss of gas tightness and combustion performance, and any other defects detrimental to its use.

k) "Defects detrimental to the use of the appliance" herein means noticeable deformation or the like.

m) When tested in accordance with **7.2.3**, the appliance shall not overturn when inclined at an angle within 10 ° in any direction and positions of the accessory parts shall not change[3]).

NOTE[3)] — "Positions of the accessory parts shall not change" means that no accessory part shall move or be disconnected.

n) When tested in accordance with **7.2.6**, the appliance shall withstand the loads it may undergo during normal use without any breakage or change detrimental to its use.

o) For those appliances constructed to release the gas when the cartridge is removed after the appliance valve is closed[4)], when the test specified in **7.2.2** is performed, the inner cubic capacity of the space where the gas accumulates before being released (excluding the part from the appliance valve to the flame port) shall not exceed 1 cm^3.

NOTE[4)] — A construction to "release the gas when the cartridge is removed after the appliance valve is closed" means a construction where the gas passage from the cartridge appliance joint to the appliance valve is opened to the atmosphere.

p) Under normal service condition, the gas taken out from the cartridge shall be in gaseous state. However, an appliance having a gasification function shall be exempted from this requirement (but it shall be tested by the method specified in **7.7** to confirm that it is free from abnormal combustion).

q) When the appliance is tested by the method described in **7.2.7 a)** with the drip pan and the pan support mounted incorrectly, ignition shall not be possible or the pot or the like shall not be stably supported.

r) When the appliance is tested by the method described in **7.2.7 b)** with the cartridge shifted from the correct mounting position, the cartridge shall not be successfully mounted in the appliance.

s) Ignition of the burner shall be normally possible with the use of a match, ignition rod or other lighting tool.

t) Edges of the part to be touched by hands during use or cleaning shall be smooth.

u) Parts that need to be removed for cleaning, repair, etc. shall normally be able to be detached/reattached with a common tool.

v) The screw threads used for assembling the parts of the appliance shall be capable of fastening the parts securely together. The parts of the appliance that need to be removed for maintenance and checks shall endure repetitive use.

w) For the gas-passing parts of the appliance, the following shall be satisfied.

1) Gas pipes shall be installed at a place free from exposure to excessive heat or from corrosion, or be given protection or other measures that does not impair the function of the appliance.

2) Joints shall be connected by welding, screwing-in, with the use of bolts and nuts, screws or the like, and shall be gastight.

3) Appliance valve specified in **5.2** shall be provided.

4) Nozzles shall be as specified in **5.3**.

5) The burner as specified in **5.4** shall be provided.

y) The burner shall be provided with the pan support specified in **5.6**.

z) The burner shall be provided with the drip pan specified in **5.7**, except for appliances for outdoor use such as camping.

aa) Cartridge attachment to and detachment from the appliance shall be smooth and secure, and shall not cause any abnormalities.

ab) When a cartridge is mounted in the appliance, there shall be no gas leakage from the joint part.

ac) The appliance shall be provided with the pressure sensitive safety device as specified in 5.10.

ad) Devices used for the appliance shall be as follows.

1) The air adjuster shall be as specified in **5.5**.

2) The electric ignition device shall be as specified in **5.9**.

ae) Under normal service condition, only the appliance legs shall be in direct contact with the table.

af) The appliance shall not move or overturn easily under normal installation condition.

ag) The appliance shall allow observation of the combustion condition of the burner from the outside. This requirement does not apply to appliances equipped with a device which automatically shuts off the gas passage to the burner when a non-ignition occurs at the time of ignition or in the case of unintended flame extinction (hereafter referred to as flame supervision device).

ah) The design of the lower burner of the lower burner type appliance and that of the double-sided burner type appliance shall be such that the burner flame is not extinguished by gravy or other cooking juice and such that cleaning of the burner is easy.

5.2 Appliance Valve

The appliance valve shall satisfy the following.

a) The appliance valve shall be capable of opening/closing the gas passage to the burner smoothly and securely. Those functioning on multiple gas-passages shall be capable of opening/closing each gas passage securely.

b) For those opening/closing by rotating operations, the rotating direction for opening the gas passage shall normally be counter-clockwise.

5.3 Nozzles

The nozzles shall be provided at positions where they are not exposed to dust or foreign matter which may cause clogging, or shall be designed to prevent such clogging.

5.4 Burner

The burner shall satisfy the following.

a) The pressing-jointed parts, welded parts or other parts shall be free from defects detrimental to the use of the burner.

b) The flame ports shall be configured with precision, and free from deformation which may affect the combustion.

c) The burner shall be attached so that its position in relation to other associated parts, for example the nozzle, electric ignition device can be maintained securely and so that, under normal use condition, it does not move or fall out of place.

d) The burner flame shall not heat or injure any other part than required to be heated.

e) The burner design shall allow easy cleaning. This does not apply to those burners whose design prevents them from being exposed to boiling overflow and the like.

5.5 Air adjuster

The air adjuster shall satisfy the following.

a) The air adjuster shall enable easy adjustment of air amount (except for appliances not requiring air adjustment during use), and its setting position shall not be shifted under normal service condition.

b) The adjuster knob, if provided, shall be located at a position convenient for operation, and its design allows smooth and secure operation.

5.6 Pan support

The pan support shall satisfy the following.

a) When tested in accordance with **7.2.6 (a)**, the pan support shall have a strength to withstand the normal service condition.

b) The pan support shall be stable under normal service condition.

5.7 Drip pan

The drip pan shall satisfy the following.

a) The design of the drip pan shall be suitable for receiving boiling overflows.

b) If removable, the drip pan shall allow easy attachment/detachment normally without the use of a tool; if integrated with the top plate, however, it may require the use of a common tool. This requirement does not apply if the construction of the appliance is such that the cleaning of the inside is easy.

5.8 Water Receiver, Net and Iron Plate

When tested in accordance with **7.3.7**, the water receiver, net and iron plate shall be free from abnormalities under boil dry condition.

5.9 Electric Ignition Device

5.9.1 *Those using electric heat*

Ignition devices which perform ignition by using electric heat shall satisfy the following.

a) The ignition heater shall be fixed so that its position in relation to the burner does not change easily.

b) Expendables such as dry cells and ignition heaters can be easily exchanged.

5.9.2 *Those using discharge device*

Ignition devices which perform ignition by using a discharge device shall satisfy the following.

a) Dry cells used for the power source can be easily replaced.

b) The electrode part shall be located at a position where it is not touched by the yellow flame under normal service condition.

c) The electrode part shall be fixed so that its position relative to the burner and the gap between electrodes do not change under normal operation.

d) The electric wiring from the discharge device to the electrodes shall be covered with an insulator having a dielectric resistance of 50 MΩ or more. Any electric wiring provided in areas

not accessible to human reach is exempted from this requirement provided that the clearance between such wiring and dead metallic part is not less than the distance between electrodes.

5.10 Pressure Sensitive Safety Device

The pressure sensitive safety device shall satisfy the following.

a) The pressure sensitive safety device shall be designed to shut-off the gas passage or disconnect the cartridge from the appliance to stop the gas feed when the pressure in the part from the cartridge-appliance joint to the high pressure part of the governor increases to ≥ 0.4 MPa but ≤ 0.6 MPa.

b) For devices designed to shut-off the gas passage when the pressure in the high pressure part increases to ≥ 0.4 MPa but ≤ 0.6 MPa, no change of pressure in the high pressure part after the shut-off of gas shall cause the gas passage to automatically reopen.

5.11 Flame Supervision Device (Applicable Only to Appliances Provided with Flame Supervision Device)

The flame supervision device shall satisfy the following.

a) When, in the test specified in **7.13 a**), the flame detecting part is damaged[5)], the flame supervision device shall automatically shut-off the gas passage to the burner.

NOTE[5)] —Damage in the flame detecting part causes the loss of electromotive force in the case of the thermocouple type, and stops the current from flowing and cause short-circuit of the electrode part in the case of the flame rod type.

b) The flame detecting part shall be fixed so that its position relative to the burner does not change under normal service condition.

5.12 Overheat Prevention Device (Applicable to Appliances Equipped with Overheat Prevention Device)

The overheat prevention device shall satisfy the following.

a) When its detecting part is damaged[6)], the overheat prevention device shall automatically shut-off the gas passage to the burner.

NOTE [6)] — Damage in the detecting part stops the current from flowing in the case of the thermal fuse type and causes breakage of the bimetal (no current flow) in the case of the bimetal type.

b) The detecting part or other parts of the overheat prevention device shall be fixed securely so that it does not easily shift from the correct attachment position.

c) When bimetal type thermal switches are used, they shall comply to **IEC 60730-2-9**

6 MATERIALS

Materials used for the appliance shall endure the mechanical, chemical and thermal effects to which the appliance may be subjected under normal service and maintenance conditions, and shall conform to the following.

NOTE – For this requirement, it can be verified by the document of declaration of conformity by the material manufacturers.

a) Materials used for the gas passage from the gas intake part to the nozzle holder inlet and from the nozzle holder to the pilot burner and the main burner (only the main burner if the pilot burner is not provided) shall have an incombustibility to withstand fusing at 350 °C and 500 °C without melting, respectively, when tested in accordance with **7.3.1**, and shall have a corrosion resistance conforming to any one of the following requirements (such materials hereafter referred to as corrosion resistance materials). These requirements do not apply to gas insulating components such as rubber (including a diaphragm and rubber valve body, hereafter the same) and sealants (including a grease, hereafter the same).

   1) The materials whose corrosion resistance were verified by the technical document review.

   2) Uncoated metallic materials which, when tested by the method described in **7.3.2 a)** for 24 h, have been found to be free from corrosion.

   3) Coated metallic materials which, when tested by the method described in **7.3.2 b)**, have been found to be free from rust, blistering or peeling.

   4) Materials which, when tested by the method described in **7.3.4**, have been found to be free from peeling in the enamelled part.

b) Rubber, sealants and other non-metallic gas insulating components used for the gas passing part shall be as follows.

   1) The material of rubber such as rubber and plastics, when tested by the method described in **7.3.3 a)**, shall not change in mass more than 20 %, and free from softening, brittleness and other defects detrimental to its use.

   2) Freedom from softening and brittleness herein means freedom from deterioration or deformation that may cause gas leakage.

   3) Sealants, when tested by the method described in **7.3.3 b)**, shall not go through mass change of more than 10 % at a gas temperature of 20 °C, and more than 25 % at a gas temperature of 4 °C.

c) The electric conductive material shall be copper, copper alloy, stainless steel or any material at least equivalent to these in electrical, thermal and mechanical stability, and shall be resistant to rust. Other material than these may be used for any part requiring elasticity or as required for structural reasons, as long as no risk of danger is associated with its use.

d) Heat insulating materials used for gas passage, combustion parts and electrical equipment vicinity parts, when tested by the method described in **7.3.5**, shall not burn, or even if they burn, the combustion shall naturally stop within 1 min of removal of the flame.

e) The material of the appliance valve, when tested by the method described in **7.3.1**, shall withstand heating at 350 °C without melting, and shall be corrosion resistant.

f) The pressure sensitive safety device shall be free from abnormality in its operation when the governor is tested by the method described in **7.3.2 a**) for 96 h with the gas passage protected

from salt water ingress, taken out from the test apparatus, and left to stand at the room temperature for 24 h.

g) The material of the air adjuster shall have a non-flammability to withstand heating at 500 °C without melting, when tested by the method described in **7.3.1**, and shall be corrosion resistant.

h) The material of the pan support shall have a non-flammability to withstand heating at 500 °C without melting, when tested by the method described in **7.3.1**.

j) The material of the drip pan shall have a non-flammability to withstand heating at 500 °C without melting, when tested by the method described in **7.3.1**, and shall be corrosion resistant.

k) Legs used for the appliance shall be as follows:

1) The material of the parts to be in contact with the table shall be rubber or such a material as not allowing the appliance to slide easily.

2) When using the material other than rubber or non-metallic material for the parts to be in contact with the table, the material shall be tested for its oil resistance by the method described in **7.3.6**, and shall be free from defects detrimental to the use.

3) The rubber used for the parts to be in contact with the table shall have Shore hardness (HS) of 50 to 90.

m) The material of the burner support shall be a non-flammable, corrosion resistant material.

n) The materials of the water receiver, net and iron plate shall have a non-flammability to withstand heating at 500 °C without melting, when tested by the method described in **7.3.1**, and shall be corrosion resistant. This requirement does not apply to the lid.

7 TEST METHODS

7.1 Test Conditions

The following test conditions shall be used.

a) **Test room condition**: The test room conditions shall be as given in Table 2, unless otherwise specified. However, for the test items to which the listed conditions are irrelevant in ensuring validity of their test results, other conditions may be used.

Table 2 Laboratory conditions
[*Clause* 7.1 (a)]

SI. No.	Item	Conditions
	(1)	(2)
i)	Test room temperature a)	20°C ± 15°C and the temperature variation during the test shall be ± 5°C
ii)	Test room humidity	65 % ± 20 %.

iii)	Test room atmosphere	The test room atmosphere shall not contain a volume fraction of more than 0.2% of carbon dioxide (CO2) and more than 0.002% of CO. Further, there shall be no air stream affecting the combustion.

b) **Testing cartridge** — The cartridge specified in Doc: MED 16 (25978), or the cartridge marked on the appliance as the cartridge to be used with that appliance. Unless otherwise specified, the cartridge shall have a rated fill capacity.

7.2 Construction Test

7.2.1 *General*

Testing for the items of which the test methods are not specified in this clause shall be performed by visual observation, operation or using test instruments, as appropriate for the requirements specified in clause **5**.

7.2.2 *Gas passage from the cartridge-appliance joint to appliance valve*

Examine for release of gas by visually observing the gas passage or by means of a gas leak detector. If release of gas is recognised/detected, confirm by measuring the inner capacity.

7.2.3 *Inclined overturning test*

Place the appliance on the horizontal surface of the incline tester (or on the test platform), and gradually incline this surface to 10 ° to observe if the appliance overturns, or if any part of the appliance shifts or dislodges in manners causing risks of fire. Perform this test in four directions, two each parallel to the length and width of the appliance.

7.2.4 *Vibration and drop tests*

Carry out the vibration test and drop test according to the following, and examine, by visual observation, operation or other means, whether the appliance satisfies the requirements for gas tightness of gas passage and combustion (under normal service condition) given in Table 1 and whether it is free from defects detrimental to its use according to the methods specified in **7.4** and **7.7.1**.

a) **Vibration test:** Place the appliance, which has been packaged for transportation[9)], horizontally on the vibration tester, and give the appliance vertical and lateral vibrations, 30 min for each, with frequency of 600 cpm and total amplitude of 5 mm.

> NOTE[9)] —Packaged for transportation" means that the appliance is given normal packaging intended for transportation, regardless of the packaging unit (how many appliances are contained in one package).

b) **Drop test:** The drop test shall be as follows.

1) Attach a cartridge to the appliance so that the appliance is ready for ignition. By means of a drop tester, drop the appliance, held horizontal with the burner facing upward, from a height of 30 cm onto a wooden floor face.

2) By means of the drop tester, drop the appliance, which has been packaged for transportation, horizontally from a height of 1 m onto the concrete floor surface.

7.2.5 *Construction test of electric ignition device*

The construction test of electric ignition devices using a discharge device shall be as follows.

a) For the position of electrode [**5.9.2 b**)], test according to **7.7.1 c**) **10**).

b) For the fixing of electrode [**5.9.2 c**)], examine by visual observation or by other means.

c) For the electric wiring from the discharge device to the electrodes [5.9.2 d)], determine the dielectric resistance of the covering by means of a 500 V dielectric resistance tester, and measure the distance from the wiring to the dead metallic part by means of a vernier calliper or a similar instrument.

7.2.6 *Load test*

The load test shall be as follows.

a) **Pan support**: Place the pan support horizontally on a surface plate, apply a static load of 50 N (a weight with a 260 mm diameter) onto the middle part of the pan support for 5 min or longer, and examine for deformation and fracture by visual observation or by other means.

b) **Appliance**: Place the appliance horizontally on a rigid board, apply a static load of 50 N (a weight with a 260 mm diameter) onto the middle part of each pan support of the appliance for 5 min or longer, and examine for deformation and fracture by visual observation or by other means.

NOTE — The load is applied by using a 50 N weight; if the appliance has multiple burners, the weight is simultaneously placed on each of the pan supports corresponding to each burner.

7.2.7 *Misuse prevention test*

The misuse prevention test shall be as follows.

a) **Test for prevention of mismounting drip pan and the like** — Mount the drip pan upside down, or remove the trivet if it is separable from the drip pan. Place a pot on the drip pan and operate ignition to examine visually or by other means whether the pot sits stably or ignition under this condition is possible.

b) Test for prevention of cartridge mismounting

The test for prevention of cartridge mismounting shall be as follows.

1) For the test, a cartridge having the maximum stem length specified in Table 3 of Doc: MED16 (25978) shall be used.

2) Try mounting the cartridge[11)] in the appliance in different mounting positions deviating from the correct mounting position in specified increments[10)]. In each position, apply a force of 150 N onto the midpoint of the operation knob (a torque of 100 N·cm for rotating types) for 3 s, and confirm that the cartridge cannot be successfully mounted in the appliance[12)].

NOTES —
[10] "Different mounting positions deviating from the correct mounting position in specified increments" mean the positions where the flange notch of the cartridge is rotated from the correct position by 60 °, 120 °, 180 °, 240 ° and 300 °.

[11] To "try mounting the cartridge" herein means to place the cartridge on the appliance and move the cartridge valve horizontally in the axial direction by means of an operation knob or the like in an attempt to fit the cartridge in the appliance.
In the case of magnet type and bracket type cartridge, it means to place the cartridge off the correct position, apply a force to the cartridge bottom to move the cartridge valve horizontally in the axial direction and try to join the magnet joints of the cartridge.

[12] "The cartridge cannot be successfully mounted in the appliance" refers to a state where no part of the cartridge is under any force exerted in any direction, and thus it is loose without being fixed.

3) After the testing described in **2**), with the appliance in normal service condition, examine whether it conforms to the requirements of gas tightness of gas passage, electric ignition performance, and activation performance of pressure sensitive safety device given in Table 1, and also the requirements given in **5.1 d**) and **v**).

7.2.8 *Air adjuster*

For confirming the setting position and operation of the air adjuster, repeat the operation of opening and closing the adjuster three to five times, and then check that the setting position has not shifted, and operation is smooth and secure.

7.2.9 *Overheat prevention device (applicable to appliances equipped with overheat prevention device)*

When bimetal type thermal switches are used, check if the switches have been verified to comply with the requirements in **IEC 60730-2-9** by document review.

7.3 Material Tests

7.3.1 *Heat resistance test*

The heat resistance test shall be as follows.

a) For materials of which melting point has been defined, identify that defined melting point.

b) For materials with unknown melting points, determine the melting point in the following procedure: put a specimen into a gas or electric furnace, raise the furnace temperature gradually up to the temperature specified in clause **6**, maintain for 1 h, and examine if the material has melted by visual observation or by referring to the record of temperature rise of the specimen.

7.3.2 *Corrosion resistance test*

Shall be according to 6.3.4.3 of ISO 23550, If corrosion resistance is not verified by technical documentation, the following tests shall be carried out:

a) **Salt spray test**: Spray the salt solution specified in ISO 9227, Clause 5, with apparatus and conditions as specified in ISO 9227, Clauses 6 and 10, for 24 h. For ISO 9227, Clauses 5 and 10, a neutral salt spray test shall be applied.

b) **Salt spray test (for coating)**: For the coated material, the crosscut is scratched with a pressing force of 5 N by a single-edged razor on the coated surface. After sealing the edges of the specimen, spray with salt water under the same conditions as in test a), and check the generation of rust and swelling in the area except within the 2,5 mm width along the crosscut and the 10 mm width along the edges. After washing the specimen with water and drying it for 24 h at room temperature, adhere a 12-mm-wide adhesive cellophane tape onto a crosscut line. Check the separation of coating in the area except within the 2,5 mm width along the crosscut line when the cellophane tape is peeled off in the direction perpendicular to the coated surface.

7.3.3 *Gas resistance test*

The compliance for gas resistance shall be verified by technical documentation review or by the following test.

a) **Gasket and valve**: Immerse the three specimens, the mass of each of which has been previously measured, in n-pentane at a temperature of ≥ 5 °C but ≤ 25 °C for 72 h or more. Remove from n-pentane, and after leaving in the air for 24 h, measure the mass change of each specimen. Calculate the mass change rate according to Formula (1), and obtain the arithmetic mean value of the three calculated results. Further, examine the specimens for deterioration or deformation detrimental to the use by visual observation or by other means.

$$\Delta M = \frac{M - M_O}{M_O} \times 100 \quad \text{---------- (1)}$$

where, ΔM: mass change rate (%)

M: mass after testing (g)

Mo: mass before testing (g)

b) **Sealant**: Spread approximately 1 g of the sealant on an aluminium plate uniformly, and leave it at an ordinary temperature for 24 h. After measuring the mass of the sealant, put the aluminium plates in a U-tube of the gas resistance test apparatus for sealant as shown in Figure 2. Open glass plugs A and B to replace the inner air with butane gas, and close glass plug B to keep the butane pressure in the U-tube at 5 kPa, while keeping the temperature of the thermostatic water tank at 20 °C ± 1 °C for 1 h and then at 4 °C ± 1 °C for 1 h. Measure the mass of the sealant at each temperature and calculate the mass change rate of the sealant according to Formula (2).

$$\Delta M = \frac{M - M_O}{M_O} \times 100 \quad \text{---------- (2)}$$

where, ΔM: mass change rate (%)

M: mass after testing (g)

Mo: mass before testing (g)

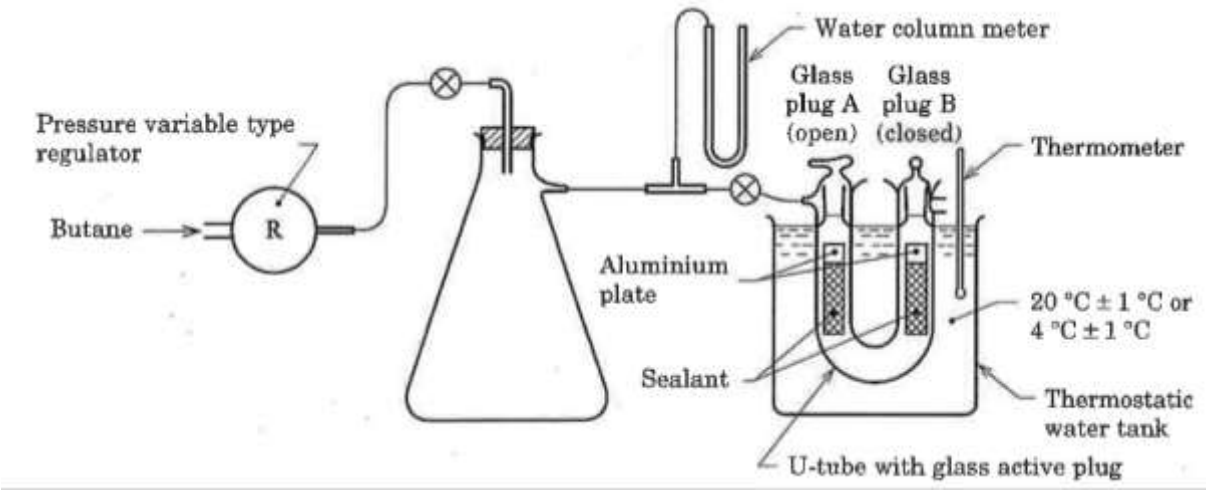


FIGURE 2 GAS RESISTANCE TEST APPARATUS FOR SEALANT

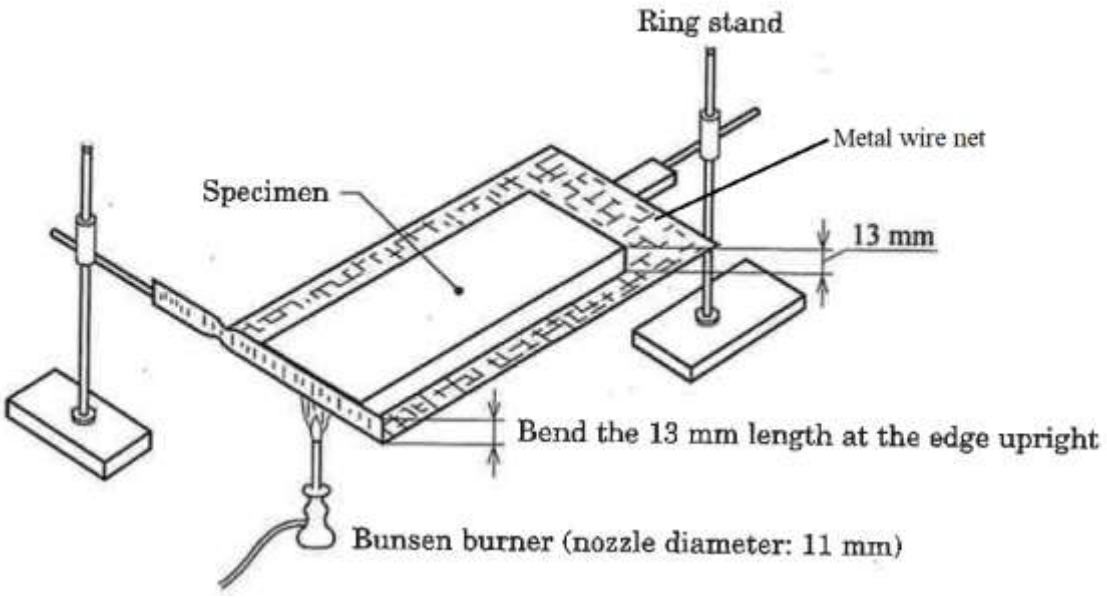
7.3.4 *Steel ball impact test*

With a burner fixed on a wooden (oak) board suitable for the size of the burner, allow a steel ball of diameter 17/16 inch (36.5125 mm, approximately 200 g in mass) specified in ISO 3290-1 to freely drop onto the flattest part of the burner from a height of 300 mm, and examine whether there is peeling on the enamelled part.

7.3.5 *Flame resistance test for heat insulating materials*

Cut out a test piece of 50 mm ± 1 mm width, 150 mm ± 1 mm length and 13 mm ± 1 mm thickness (or the original size where taking in the specified size is infeasible) from a position in which the density is approximately uniform, and mount it on the test apparatus shown in Figure 3. After exposing the specimen to a flame for 1 min, distance the flame from the specimen by at least 20 cm to examine visually whether the specimen burns or not.

If the specimen burns, measure the time required for flame extinction to be attained.



1. Wire diameter of metal wire net: 0.8 mm
2. Pitch of metal wire net: 6.4 mm
3. Metal wire net dimensions: 76 mm × 216 mm
4. Fix the metal wire net horizontally
5. After adjusting the height of the blue flame to about 38 mm, place the burner so that the centre flame aligns with the vertical section of the vertically bent part of the metalwire net, ensuring that the distance between the top end of the burner and the metallic mesh is 13 mm.

FIGURE 3 FLAME RESISTANCE TEST APPARATUS

7.3.6 *Oil resistance test*

For the oil resistance test of rubber or other material used for the legs of the appliance, immerse the specimen in edible oil (soybean oil or the like) at a temperature of 20 °C ± 15 °C for 24 h to examine for any severe deformation detrimental to the use.

7.3.7 *Boil dry performance test (applicable to water receiver, net and iron plate)*

Set the water receiver, net or iron plate without putting water in it, and ignite the burner. For the duration of 30 min from the ignition, examine if the container is free from peeling of the surface coating (including fluororesin coating). For the enamel coat, examine for cracks and peeling. When the surface coating of the water receiver has peeled, test the substrate material according to **7.3.2** to confirm that it is a corrosion resistant metallic material or a metallic material given corrosion resistant treatment.

When the surface coating of the net and iron plate has peeled, confirm that the peeled material is harmless to humans based on the safety data sheet of the material used for coating or based on other means.

7.4 Gas Tightness Test of Gas Passage

The gas tightness test of gas passage shall be as follows.

a) For testing the cartridge appliance joint, set the appliance in the test apparatus shown in Figure 4, apply a pressure of 0.9 MPa, and examine for leakage using a test solution or the like. In the case of appliances equipped with a pressure sensitive safety device and constructed with a detachable cartridge, perform the test applying a pressure up to the activating pressure of the pressure sensitive safety device.

b) For testing the gas passage from the cartridge-appliance joint to the high pressure side of the governor, set the appliance in the test apparatus shown in Figure 4, apply a pressure of 0.9 MPa, and examine for leakage at each part using a test solution or the like.

c) For testing the gas passage from the governor low-pressure side to the appliance valve, mount the cartridge in the appliance, and with the appliance valve fully open, examine for leakage at each part using a detecting flame, test solution, or the like.

   Then examine for leakage with the appliance valve fully closed.

d) For testing the gas passage from the appliance valve to the flame port, fully open the appliance valve, and ignite the burner to examine for leakage at each part using a detecting flame.

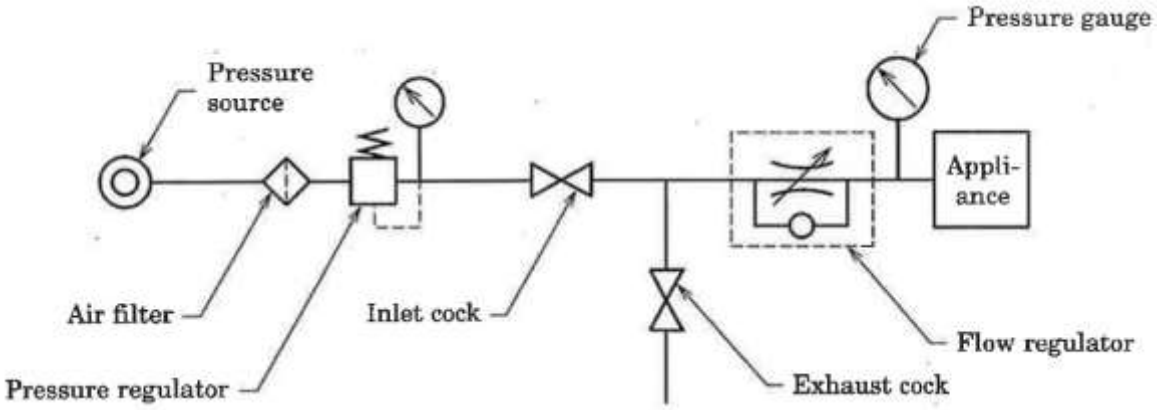


FIGURE 4 APPARATUS FOR GAS TIGHTNESS, PRESSURE RESISTANCE AND PERFORMANCE TESTS

7.5 Pressure Resistance Test of Gas Passage

The pressure resistance test of gas passage shall be as follows.

a) For testing the gas passage from the cartridge to the governor, set the appliance in the test apparatus shown in Figure 4, apply a pressure of 1.3 MPa for 1 min or longer and examine for leakage, or deformation and breakage detrimental to the use by visual observation. For those appliances equipped with a pressure sensitive safety device and constructed with a detachable cartridge, carry out the test ensuring that the cartridge will not come off the appliance.

b) For testing the gas passage to the high pressure side of the governor, use the method specified in **a**) and examine for leakage, deformation and breakage detrimental to the use by visual observation.

7.6 Gas Consumption Test

The gas consumption test shall be as follows.

a) **Test conditions**: The test conditions shall be as follows.

1) **Test cartridge**, specified in **7.1 b**), which has been left in the air at a temperature of 20^{+5}_{0}°C for a duration of at least 2 h.

2) **Room temperature during the test**: The room temperature during the test shall be 20^{+5}_{0}°C.

3) **Appliance condition**: The appliance shall be tested under a service condition with the maximum gas consumption.

i) The cooker part shall be tested under normal service condition.

NOTE —
1. The normal service condition of the cooker part means a condition where a testing pot of the size as given in Table 3, containing water up to at least one-third of the pot depth, is placed on the cooker with the burner ignited and burning.
2. For burners used by adjusting the amount of air to be supplied, the air flow shall be adjusted so that a good burning condition is achieved.

ii) For appliances used by putting water in their containers such as a water receiver, ensure that the water level in the container during the test is never lower than half the container depth by replenishing water as required.

iii) The appliances used with a net or iron plate shall be tested under boil dry condition.

iv) The appliances equipped with an overheat prevention device shall be tested under such a condition as not causing the device to activate.

v) For appliances whose gas passage is shut-off by activation of a device other than an overheat prevention device, such as a timer, the test shall be performed by reigniting the burner immediately after the activation.

b) **Test method** — Carry out combustion for 30 min after ignition on each of three cartridges, and obtain the gas consumption (g/h) from Formula (3).

$$W = \frac{2}{3}\sum_{n=1}^{3}(W_{0n} - W_n)$$

$$= \frac{2}{3}[(W_{01} - W_1) + (W_{02} - W_2) + (W_{03} - W_3)] \text{ ---------- (3)}$$

where, W : gas consumption (g/h)

W_{0n} : mass of cartridge before test (g)

W_n : mass of cartridge after test (g)

Table 3 Size of testing pot
(*Clause* 7.6)

Sl. No.	**Gas consumption** g/h	**Nominal size of pot** cm	**Bore diameter** mm	**Depth** mm	**Mass** g	**Water level for thermal efficiency measurement** kg
	(1)	(2)	(3)	(4)	(5)	(6)
i)	90 or under	14	140	64	130	0.65
ii)	Over 90 up to and incl. 115	16	160	73	155	1.0
iii)	Over 115 up to and incl. 145	18	180	82	190	1.4
iv)	Over 145 up to and incl. 175	20	200	91	250	2.0
v)	Over 175 up to and incl. 210	22	220	100	300	2.7
vi)	Over 210 up to and incl. 250	24	240	109	380	3.5
vii)	Over 250 up to and incl. 300	26	260	118	470	4.4

viii)	Over 300	28	280	128	585	5.6
		30	300	137	720	
		32	320	144	860	

NOTE —

1. Gas consumption shall be set to the specified gas consumption value of the individual burners, which is marked by the manufacturer on an operational manual or the like.
2. The testing pots shall have no handles.
3. The shape of the pot shall be cylindrical.
4. The tolerances shall be ± 3 % for bore diameter and $^{+10}_{-3}$ % for depth.
5. The mass requirement is applicable only to the pots used for the heat efficiency test, with tolerance of +5 % under the condition where the handles and lid are removed.

7.7 Combustion Test

7.7.1 *Normal service condition*

The combustion test under the normal service condition, unless otherwise specified, shall be as follows.

a) **Test condition** — The test conditions shall be as specified in **7.6 a**), except that the testing cartridge used shall be the cartridge specified in **7.1 b**) filled with gas of 50 % mass of the rated fill capacity.

b) **Conditions of appliance** — The installation and service conditions of the appliance, and the state of the appliance valve and the like shall be as follows.

1) **Installation condition of appliance** — The appliance shall be installed on a horizontal wooden base.
2) **Service condition of appliance** — Set the appliance in the normal service condition specified in **7.6**.

i) For the cooker part, ensure that the water level in the pot during the test is never lower than half the pot depth by replenishing water as required.

ii) For those appliances which are used by putting water in their containers such as a water receiver, ensure that the water level in the container during the test is never lower than half the container depth by replenishing water as required.

iii) The appliances used with a net or iron plate shall be tested under boil dry condition.

iv) The appliances equipped with an overheat prevention device shall be tested under such a condition as not causing the device to activate.

v) For appliances whose gas passage is shut-off by activation of a device other than an overheat prevention device, such as a timer, the test shall be performed by reigniting the burner immediately after the activation.

3) **State of appliance valve etc.**— The state of the appliance valve etc. in those appliances which are used by adjusting the gas consumption with the appliance valve and other gas consumption adjusting devices (hereafter referred to as the appliance valve etc.) shall be tested under the conditions specified in c) below.

c) **Test method** — The test method shall be as follows.

Perform the test on each burner. When the gas in the cartridge has run out during the test, immediately replace the cartridge with a new one to resume the test.

1) **Ignition** — For appliances of which the gas consumption is adjustable, test continuously five times with the consumption amount set to "large" all five times.

   i) Examine if the ignition at the end (flame port) of the main burner is secure14) and measure the time required for ignition to be achieved at all flame ports.
   For appliances directly ignited with an electric ignition device, ignite with that device; for appliances ignited with a lighting torch or pilot burner, ignite using either; for appliances neither of the above, ignite using a match or inducing flame.

   NOTE [14)] — Burner ignition is recognised to be "secure" when all five attempts of ignition out of the five made succeed.

   ii) Examine for explosive ignition.

   iii) For appliances equipped with a lighting torch or a pilot burner, examine the difficulty in lighting up from the lighting torch/pilot burner to an end port of the main burner.

2) **Flame lifting**— Visually examine for lifting of flames 15 s after igniting the burner.

3) **Unintended flame extinction** — Visually examine for unintended flame extinction 15 s after igniting the burner.

4) **Flame uniformity** — Ignite the burner, and after the flames have stabilised, visually examine the uniformity of the flames.

5) **Backfire**— Visually examine for backfire for 30 min after igniting the burner.

6) **Continuous noise** — Ignite all the burners, and measure the maximum continuous noise according to the following.

   Measure the noises at three points shown in Figure 5 using a sound level meter, by A weighted sound pressure level according to ISO 1996 (Part 1) and ISO 1996 (Part 2), and under the following conditions.

   i) Place microphones at a distance of 1 m from the approximate mid-point of the outline of the appliance to avoid influence by exhaust gas and the like.

   ii) The background noise should be at least 10 dB smaller than the noise of the appliance.

   iii) With the appliance being used, the noise in vicinity of the wall nearest to the appliance should be at least 8 dB smaller than the noises at the measuring positions shown in Figure 5. This does not apply if the test is performed in an anechoic room.

   iv) Record the maximum value among the noise measurements made at three points shown in Figure 5.

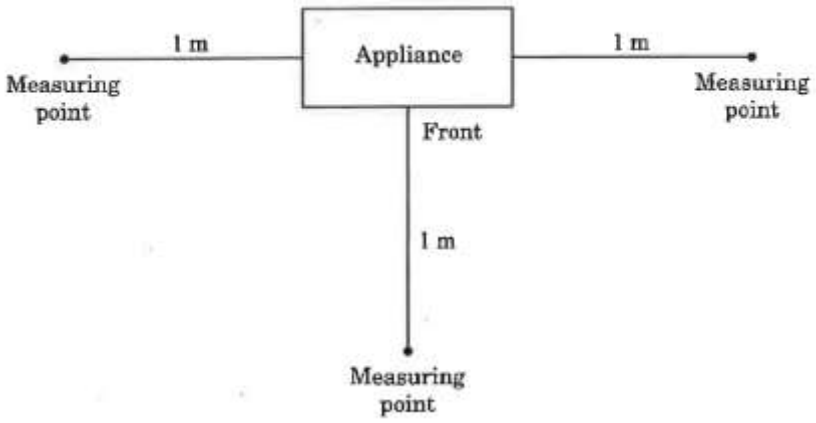


Figure 5 Noise measuring points

7) **Extinction noise** — Extinguish the burner 30 min after igniting it, and examine if there is an explosive noise.
For extinction of the burner, manually close the appliance valves quickly one by one. For appliances equipped with an automatic extinguishing device, examine at the time of automatic shut-off.

8) **CO%** — Ignite the burner, and after 15 min, sample combustion gas all along the pot periphery as uniformly as possible, at a distance of 3 mm from the side sur face of the pot and at a height lower than the upper rim of the pot by one third of the pot height. Measure the CO and O2 concentrations in the dry combustion gas, and calculate the CO % according to Formula (4).

The combustion gas in other parts than the cooker part shall be sampled uniformly by means of the hood above the exhaust port or a sampling tube.

$$CO = CO_a \times \frac{21}{21 - O_{2a}} \quad \text{---------- (4)}$$

Where the test gas components have been identified, the calculation may be performed using Formula (5) based on measurements of CO and CO2 concentrations in the dry combustion gas.

$$CO = CO_a \times \frac{CO_{2\,max}}{CO_{2a} - CO_{2t}} \quad \text{---------- (5)}$$

where, CO : CO concentration in theoretical dry combustion gas (volume fraction %)

CO_a : CO concentration in dry combustion gas (volume fraction %)

$O2_a$: O2 concentration in dry combustion gas (volume fraction %)

CO_{2max} : CO2 concentration in theoretical dry combustion gas (volume fraction %)

CO_{2a} : CO2 concentration in dry combustion gas (volume fraction %)

CO_{2t} : CO2 concentration measured in gas inlet atmosphere (dry condition) (volume fraction %)

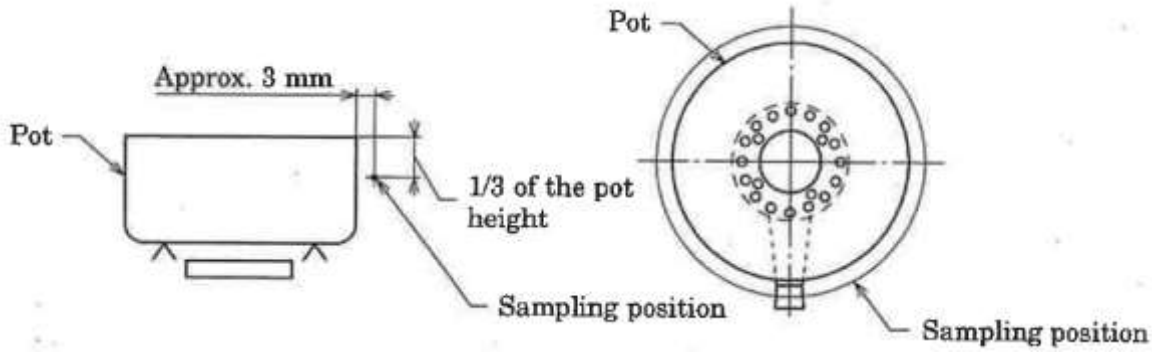


Figure 6 Sampling position of combustion gas

9) **Soot generation** — Examine for soot generation for 30 min after igniting the burner by visual observation or by other means.

10) **Yellow flame contact** — Visually examine the electrode part of the ignition device 15 min after igniting the burner.

7.7.2 *Service condition of oversize pot*

Place on the appliance a pot with a bore diameter 60 mm larger than that of the applicable testing pot specified in Table 3, ignite the burner, allow to burn with the appliance valve fully open, and examine if there is any flickering of flame, fogginess or irritating odour in the combustion gas by visual observation or by other means.

7.8 Flame Extinction Performance Test

After igniting the burner, close the appliance valves and measure the time required for extinction to be attained.

For extinction of the burner, manually close the appliance valves quickly one by one. For appliances equipped with an automatic extinguishing device, examine at the time of automatic shut-off.

7.9 Temperature Rise Test

7.9.1 *Temperature rise during normal use*

The test of temperature rise during normal use shall be as follows.

a) **Testing cartridge**, as specified in **7.1 b**).

b) **Condition of appliance**, as follows.

1) **Installation condition of appliance** — Install the appliance on a temperature measuring board as shown in Figure 7 according to **7.7.1 b**) **1**).

   If there is a special instruction for installation of the appliance in the case of using a heat insulating plate or any similar provision thereto (hereafter referred to as heat insulating plate etc.), perform the test also under the condition that the appliance is installed with the heat insulating plate etc. according to the given instruction.

2) **Service condition of appliance** — Bring the appliance into a service condition where the gas consumption is maximum, and cooker burners which are usable simultaneously into the service condition specified in **7.7.1 b**) **2**). Other conditions shall be as follows.

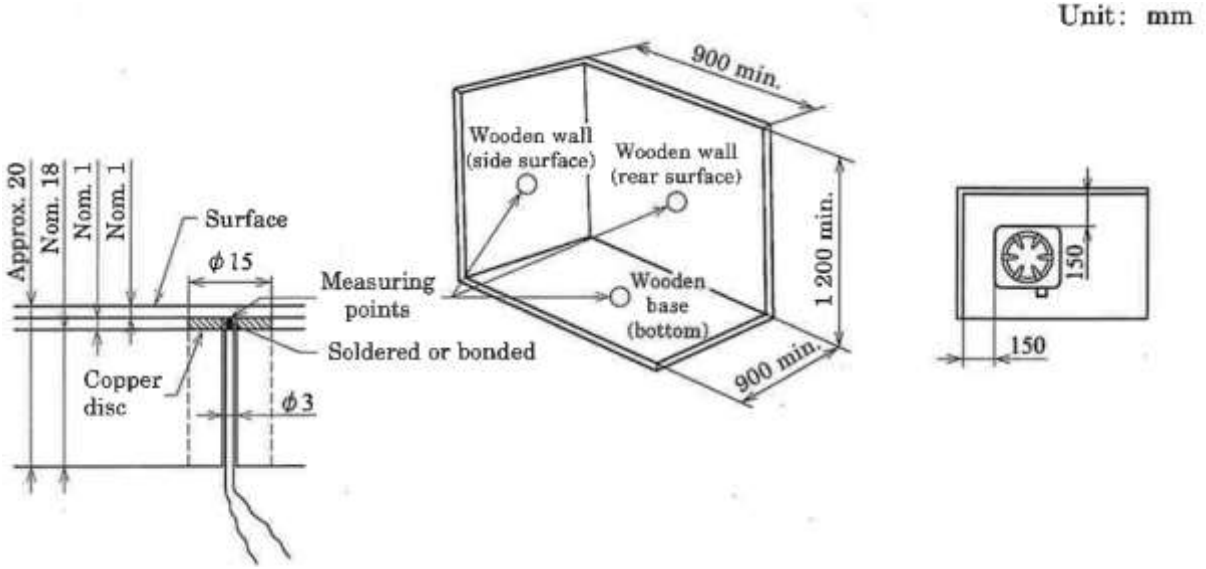
   i) For appliances provided with a water receiver, test under the condition that there is no water in the receiver.
   ii) For appliances used with a net or iron plate, test under boil dry condition.
   iii) For appliances used with a lid, test under boil dry condition with the lid on. For appliances which allow observation of the inside condition even with the lid in place, perform the test with the container filled with water up to half its depth.

c) **Temperature measuring time**: Measure the temperature of the specified measuring point (Table 1) until it no longer fluctuates over time, the maximum duration being 1 h from the burner ignition.

For appliances equipped with an overheat prevention device, stop the measurement when the overheat prevention device has activated to shut-off the gas passage. When the gas in the cartridge has run out during the test, immediately replace the cartridge with a new one to resume the test.

NOTE — Appliances with an overheat prevention device are also tested with the container filled with water to a level not lower than half their depth. Further, appliances whose gas passage is shut-off by an operation of a system (e.g. control system) other than an overheat prevention device are tested immediately after re-ignition following the activation of such system.

Unit: mm



1. The wooden base and walls shall be composed of sufficiently seasoned sheets of plywood that are pressure-bonded together to achieve thickness of 20 mm, and finished with varnish for the wooden base and with mat black paint for the wooden walls.
2. The sizes of wooden base and walls shall be sufficient for the size of the appliance.

3. As many thermocouples as possible shall be embedded at equal intervals in a grid arrangement, so that temperature can be measured at any selected point.
4. The copper disc and the thermocouple shall be soldered or bonded together, and embedded in a depth of approximately 1 mm from the surfaces of the wooden base and walls.

FIGURE 7 MEASURING BOARD FOR SURFACE TEMPERATURE OF WOODEN BASE AND WALLS

7.9.2 *Temperature rise during use of oversize pot*

Perform the test according to the method described in **7.9.1** using a testing pot of a bore diameter larger by 60 mm than that of the testing pot given in Table 3.

7.10 Electric Ignition Performance Test

7.10.1 *Test conditions*

The test conditions shall be in accordance with **7.6 a**). For appliances using dry cells, the voltage shall be 70 % of the nominal voltage, or if ignition is not possible at this voltage, the minimum voltage at which ignition is possible.

7.10.2 *Test method*

Perform the igniting operation repeatedly 10 times by a means indicated in the operational manual and the like or that given in the following, and examine the number of ignitions and if any explosive ignition occurs.

a) Carry out the preliminary test several times beforehand.

b) For each igniting operation, ensure that the temperature of and around the ignition device is brought close to room temperature.

c) What constitutes one igniting operation and how quick the operation is depend on the ignition source generating system, and shall be as follows.

   1) For appliances of which the ignition source is generated once by one operation such as piezoelectric ignition system of single firing type, regard the one operation as once.
   One igniting operation shall normally take 0.5 s to 1 s.

   2) For appliances of which the ignition source is generated consecutively by a rotating operation such as piezoelectric ignition system of rotating consecutive type, regard one revolution as one operation. One igniting operation shall take the same time as **1**).

   3) For appliances of which the ignition source is generated continuously by one operation such as dry cell discharge or heater ignition system, regard holding at the “ignition” position or the like for 2 s as once.

7.11 Cartridge Inner Pressure Test

Measure the inner pressure of the cartridge by means of a pressure gauge during the tests specified in **7.9.1** and **7.9.2** from the point of ignition up to point where the pressure has stabilised after flame extinction, and obtain the maximum pressure during this time.

7.12 Activation Performance Test of Pressure Sensitive Safety Device

The activation performance test of the pressure sensitive safety device shall be as follows.

a) With the appliance mounted on a test apparatus as shown in Figure 4, apply a pressure increased at a rate of 50 kPa/s, and note the activating pressure of the safety device.

b) For safety devices designed to shut-off the gas passage upon activation, confirm that the gas passage does not open automatically when the pressure in the high pressure part is changed gradually.

7.13 Activation Performance Test of Flame Supervision Device (Applicable Only to Appliances Provided with Flame Supervision Device)

The activation performance test of the flame supervision device shall be as follows.

a) **Flame detecting part** — Examine whether or not the gas passage to the burner is shut off when a damage is caused to the flame detecting part.

b) **Safety device designed to automatically shut off the gas passage** — The safety devices designed to automatically shut off the gas passage at the time of non-ignition or flame extinction shall be tested as follows.

1) Mount the cartridge specified in **7.1 b**) in the appliance and, after performing ignition according to the normal procedure, measure the time until the valve opening condition stabilises.

2) Mount the cartridge specified in **7.1 b**) in the appliance, ignite the burner, and after 15 min, extinguish the burner. Under the extinguished condition, exchange the filled cartridge with a spurious cartridge, and open the appliance valve to allow continuous release of air of 0.2 MPa from the spurious cartridge, and measure the time from flame extinction to closing of the valve of the safety device.

3) Mount the spurious cartridge in the appliance, feed the air of 0.2 MPa, perform the normal ignition operation, and measure the time from opening of the valve of the safety device to closing of the valve.

7.14 Activation Performance Test of Overheat Prevention Device (Applicable to Appliances Equipped with Overheat Prevention Device)

The activation performance test of the overheat prevention device shall be as follows.

a) **Detecting part of overheat prevention device** — Examine whether or not the gas passage to the burner is shut-off when a damage is caused to the detecting part of the overheat prevention device.

b) Heat the temperature sensitive part up to the temperature specified by the manufacturer, and examine whether or not the gas passage is automatically shut-off and also whether or not the gas passage automatically reopens when the temperature returns to the normal level.

7.15 Cycle Test

The Cycle test of each part of the appliance shall be as follows.

a) **Appliance valve** — Repeat the opening/closing operations at a rate of 5 times/min to 20 times/min for the number of times given in Table 1, and examine the following.

1) **Gas leakage** — Examine in accordance with **7.4**.

2) **Defects detrimental to the use** — Examine for the difficulty in opening/closing and for fractures by visual observation, operation and the like.

b) **Electric ignition device** — Repeat the igniting operation at a rate of 5 times/min to 20 times/min for the number of times given in Table 1, and examine the following.

1) **Electric ignition performance** — Examine according to **7.10**.

2) **Defects detrimental to the use** — Examine by visual observation, operation or other means.

c) **Governor** — Repeat the following operation for the number of times specified in Table 1: apply an air pressure of 0.2 MPa to the governor for 2 s to 3 s and then stop the pressure for 2 s to 3 s. After completing the number of repetitions specified in Table 1, examine the following. Carry out this test also with the same air pressure as the activating pressure of the pressure sensitive safety device.

1) **Gas leakage** — Examine in accordance with **7.4**.

2) **Change of regulated pressure** — Using the cartridge as specified in 7.6 a) 1) and with the gas flowing, measure the regulated pressure (outlet side) before and after the test, and calculate the change rate of regulated pressure according to Formula (6).

$$\Delta P = \frac{P - P_0}{P_0} \times 100 \quad \text{---------- (5)}$$

where, ΔP : change rate of regulated pressure (%)

P : regulated pressure after test (Pa)

P0 : regulated pressure before test (Pa)

d) **Pressure sensitive safety device** — After applying an air pressure increased up to 0.6 MPa at a rate of 50 kPa/s and then returned to 0 MPa, repeat the operation of opening and closing the gas passage or attaching and detaching the cartridge at a rate of 5 times/min to 20 times/min for the number of times specified in Table 1, and examine the following.

1) Gas leakage Examine in accordance with **7.4**.

2) Activation performance Examine in accordance with **7.12**.

e) **Cartridge-appliance joint** — Repeat the operation of attaching and detaching the cartridge by a means indicated by the manufacturer (in the instruction manual and the like) at a rate of 5

times/min to 10 times/min for the number of times specified in Table 1, and examine for gas leakage according to **7.4**.

f) **Flame supervision device (applicable to the appliance equipped with flame supervision device)** — Repeat the following operation for the number of times specified in Table 1: apply a flame for 2 min to the flame detecting part of the flame supervision device, open the valve of the device, remove the flame and allow the device to naturally cool for 3 min, and then close the valve of the device. After completing the specified number of repetitions, examine the following.

1) **Gas leakage**: Examine in accordance with **7.4**.

2) **Activation performance**: Examine in accordance with **7.13**.

7.16 Practical Performance Test of Appliance

The practical performance test of the appliance shall be as follows.

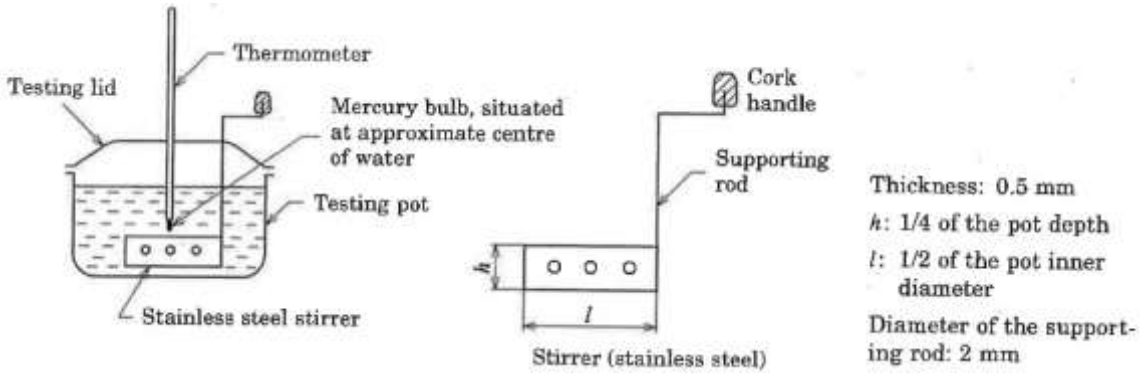
a) **Test conditions** — The cartridge specified in **7.6 a**) **1**) shall be used.

b) **Appliance condition** — Connect the appliance to the test apparatus for the gas consumption test specified in 7.6. On the cooker burner, put a testing pot specified in Table 3 containing the amount of water indicated in the said table, fully open the appliance valve etc. If the burner is equipped with an air adjustment function, adjust the amount of air so as to obtain a good combustion state.

c) **Test method** — As shown in Figure 8, put a testing lid on the testing pot containing water and ignite the burner. When the water temperature has increased by 45 °C from the initial temperature, start the agitator, and when it has increased by 50 °C from the initial temperature, stop the gas. Continue stirring, and record the maximum temperature attained during this time as the final water temperature (t2). Measure the amount of gas consumed (V) and other necessary values, and calculate the thermal efficiency from the following formula.

$$\eta = \frac{M \times C \times (t_2 - t_1)}{V \times Q} \times 100 \quad \text{---------- (7)}$$

where,
- η : thermal efficiency (%)
- M : mass of water heated in the test (kg)
- C : specific heat of water heated in the test 4.2[kJ/(kg × K)]
- t2 : final temperature of water heated (°C)
- t1 : initial temperature of water heated (°C)
- V : amount of gas actually consumed (g)
- Q : total calorific value of consumed has (kJ/g)



1. The testing lid shall fit the testing pot, and as shown in Figure 8, shall be provided with a hole in the centre through which an etched-stem mercury-in glass thermometer can be inserted and fixed so that the mercury bulb is situated at an approximate centre of the water filled in the pot, and is not in contact with the agitator.
   The etched-stem mercury-in-glass thermometer shall have a measuring range of 0 °C to 100 °C and the minimum scale of 0.5 °C.
2. The initial temperature of the water subjected to heating (test) shall be approximately equal to room temperature;
3. Perform the test twice or more under the same conditions, and when the difference between the two consecutive thermal efficiency measurements becomes 5% or less of the arithmetical mean of the two, the mean value shall be taken as the thermal efficiency.

FIGURE 8 APPARATUS FOR PRACTICAL PERFORMANCE TEST

7.17 Heat Resistance Test of Functional Parts

Carry out the temperature rise test under normal service condition specified in 7.9.1, and if the measured temperature in the test is found to exceed the reference temperature, proceed to further testing described in the following.

The test temperature for the following testing shall be that corresponding to the heat resistance class in Table 4 assigned based on the temperature observed when the reference temperature is exceeded in the test under normal service condition.

7.17.1 *Surface of appliance valve and other valves used for gas-passing parts*

Place the specimen in a thermostat maintained at the temperature corresponding to the relevant heat resistance class given in Table 4, and leave in this condition for 24 h. Remove from the thermostat, allow to cool until the specimen attains room temperature, and examine the following.

a) **Gas leakage**: Examine according to **7.4** if the appliance is free from gas leakage both with the appliance valve “open” and “closed”.

b) **Abnormality in operation**: Perform normal operation of the appliance and examine for any abnormalities in operation of the appliance valve, and in opening and closing of the valve.

7.17.2 *Ignition unit*

Place the specimen in a thermostat maintained at the temperature corresponding to the relevant heat resistance class given in Table 4, and leave in this condition for 24 h. Remove from the thermostat, allow to cool until the specimen attains room temperature, and examine the following.

a) **Electric ignition performance**: Examine according to **7.10**.
b) **Deformation and discolouration**: Visually examine for deformation and discolouration.

7.17.3 *Governor*

Place the specimen in a thermostat maintained at the temperature corresponding to the relevant heat resistance class given in Table 6, and leave in this condition for 24 h. Remove from the thermostat, allow to cool until the sample attains room temperature, and examine the following.

a) **Gas leakage** — Examine according to **7.4** if the appliance is free from gas leakage.

b) **Change of regulated pressure** — Measure the regulated pressure (outlet side) before and after test, and calculate the change rate of regulated pressure according to Formula (6) given in 7.15 c) to examine whether it is 8 % or less.

Table 4 Heat resistance class
(*Clause* 17.17)

Sl. No.	**Heat resistance class**	**Temperature °C**
	(1)	(2)
i)	15	150
ii)	14	140
iii)	13	130
iv)	12	120
v)	11	110
vi)	10	100
vii)	9	90
viii)	8	80

8 MARKING

8.1 Appliance Marking

Any label shall not block the ventilation openings of the or cartridge compartment. The appliance shall carry the following information, in a visible and durable fashion, in the official language(s) of the country in which the appliance is to be sold:

a) Name of the manufacturer or his identifying symbol;
b) Postal address of the manufacturer. If not possible, on the packaging or in a document accompanying the appliance;
c) Appliance name;
d) Brand and type of the gas cartridge intended to be used with the appliance, in the form:
NOTES–
1) This appliance shall only be used with ZZZZ[1] Butane[2] (Cartridge) confirming to Doc: MED16 (25978).

2) This appliance shall only be used with the non-refillable gas cartridge.

e) Text 'Only use in well ventilated areas'.
f) text 'Read the instructions before using the appliance';

This information may be given on durable labels fixed onto the appliance.

[1] For example: trade mark A, model B.
[2] The Type of gas may be shown here.

8.2 Packaging Marking

The packaging of the appliance shall carry the information in [7.1 c) to g)] in the official language(s) of the country in which the appliance is to be sold.

8.3 BIS Certification Marking

The product may also be marked with Standard Mark.

8.3.1 The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act, 2016* and the Rules and Regulations framed thereunder, and the products may be marked with the Standard Mark.

9 INSTRUCTIONS FOR USE, MAINTENANCE AND ASSEMBLY

9.1 General

Instructions for use, maintenance (storage, cleaning, checking before use etc) and assembly intended for the user shall be supplied with each appliance and shall give all necessary information to use the appliance safety and sensibly. Readability is determined by the combination of font size (the minimum letter size of 1.2 mm height
can be used as a reference), letter spacing, spacing between lines, colour, width-height ratio of the letters and significant contrast between the print and the background.

The instructions shall give at least the information listed in **8.2**, in the official language(s) of the country in which the appliance is to be sold.

9.2 Instruction Contents

9.2.1 *Important*

Read these instructions for use carefully so as to familiarize yourself with the appliance before connecting it to its gas cartridge. Keep these instructions for future reference.

9.2.2 *An Introduction Containing the Following Information*

a) Name of the manufacturer and his identifying symbol;
b) Appliance name;
c) Type of gas, the appliance cartridge and the type of gas cartridge(s) to be used
stating:" This appliance shall only be used with the XYZ (gas);
This sentence shall be followed by 'It may be hazardous to attempt to it fit other types of gas cartridge';
d) Injector marking (if it is removable);
e) Nominal rate in g/h and kW (Hs); and

f) Statement: ‘Use only in a well-ventilated area’,

9.2.3 *The following safety information*

a) Where applicable the statement: ‘Check those seals (between the appliance and the gas cartridge)’ are in place and in good condition before connecting to the gas cartridge;

b) Drawing showing the position of these seals (if applicable);

c) Statement ‘Do not use the appliance if it has damaged or worn seals’ ‘Do not use an appliance which is leaking, damaged or which does not operate properly’;

d) Statement requiring that appliances, be used in a well-ventilated location:

1) or the supply of combustion air, and
2) to avoid the dangerous building up of un-burnt gases for appliances not fitted with a flame supervision device.

e) Statement that the appliance shall be operated on a horizontal surface, unless it is not intended to operate resting on a surface;

f) Statement that the appliance shall be used away from flammable materials and information on minimum distances from adjacent surfaces (wall, ceiling);

g) Statement that gas cartridge shall be changed in a well-ventilated location, preferably outside, away from any sources of ignition, such as naked flames, pilots, electric fires and away from other people;

h) Statement that ‘If there is a leak on your appliance (smell of gas), take it outside immediately into a well-ventilated flame free location where the leak may be detected and stopped. If you wish to check for leaks on your appliance, do it outside. Do not try to detect leaks using a flame, use soapy water’.

9.2.4 *The following information for use*

a) Advise on how to use the appliance when it is hot and the statement:
“CAUTION: accessible parts may become very hot. Keep young children away from the appliance”.
b) Advise on how to store the appliance when it is not in use;
c) How to light the appliance;
d) How to adjust the rate and (if applicable) the meaning of the symbols used for the various adjustment positions, and
e) Information on the phenomenon of flaring which may occur during the warmup period or if the appliance is moved. The indication on the duration of any warmup period shall be specified (if applicable).

9.2.5 *The following information for assembly*

a) if the appliance is not fully factory assembled, assembly by the user shall be precisely described (with drawings) so as to avoid any dangerous assembly by the user;
b) correct way of connecting the appliance to a gas cartridge;

c) how to check that the appliance is connected to the gas cartridge in a sound fashion;
d) how to detect leaks (*see* 8.2.3 h); and
e) how to fix any stabilizer supplied with the appliance (if applicable)?

9.2.6 *The following information for changing the gas cartridge*

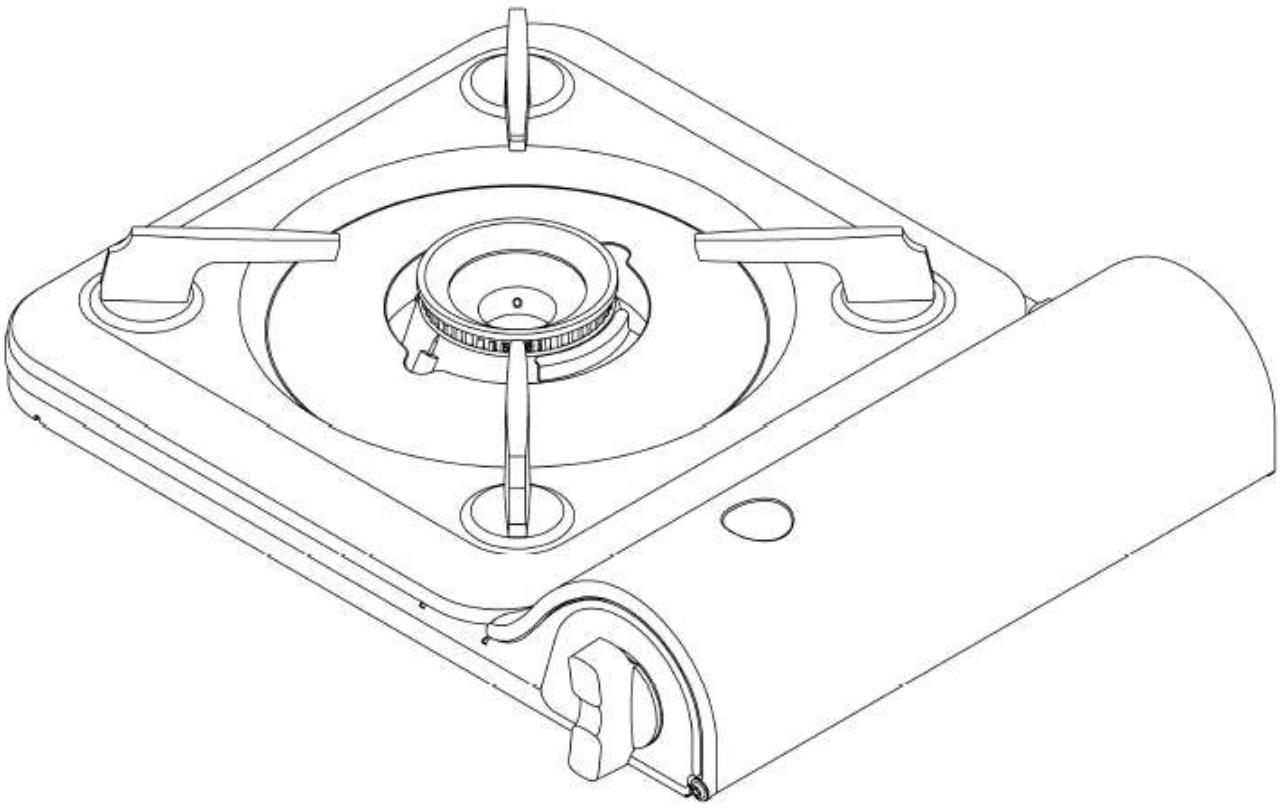
a) 'Check that burners are extinguished before disconnecting the gas cartridge';
b) Full details on how to disconnect the gas cartridge;
c) 'Check the seals before connecting a new gas cartridge to the appliance';
d) 'Change the gas cartridge in a well ventilated location and away from people'; and
e) Information for the safe connection of the gas cartridge.

9.2.7 *The following information on routine maintenance of the appliance*

a) Cleaning the injector (if necessary); and
b) Identification of seals replaceable by the user and how to replace them, and identification of non-metallic radiant elements.

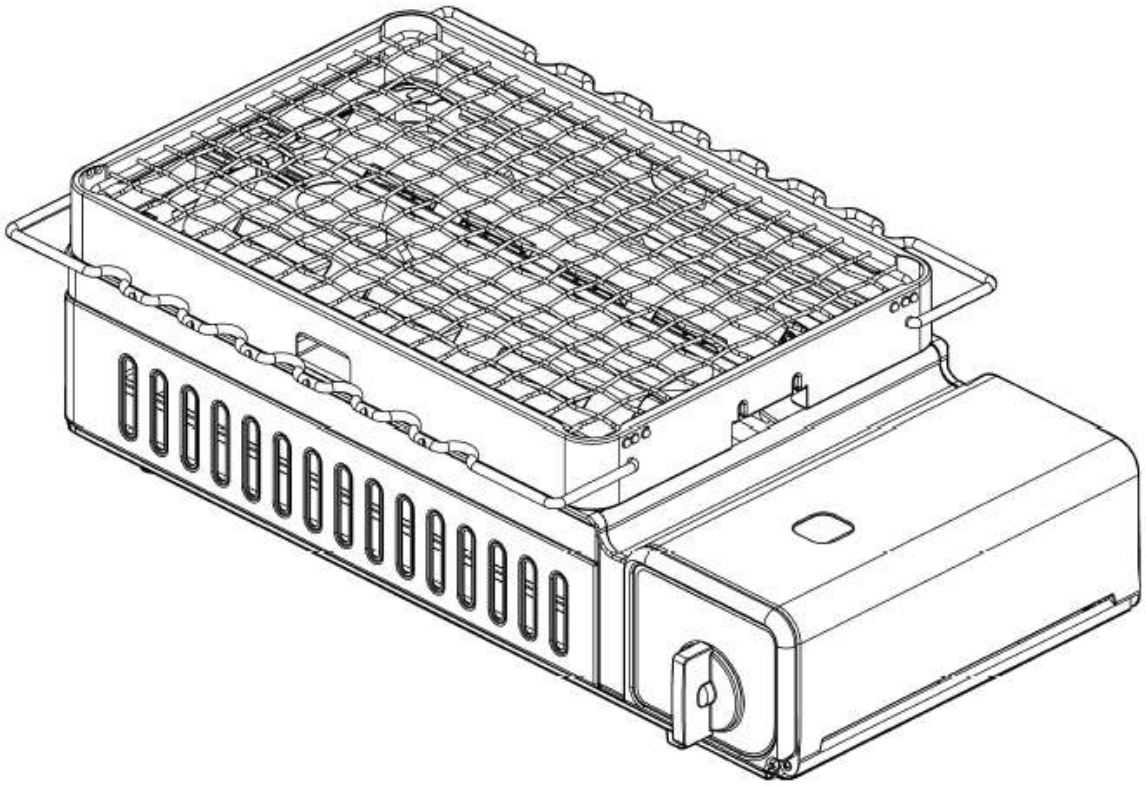
9.2.8 *Information for general maintenance and repairs*

a) Text 'Do not modify the appliance'; and
b) How to send the appliance back to the manufacturer or to a repair centre.



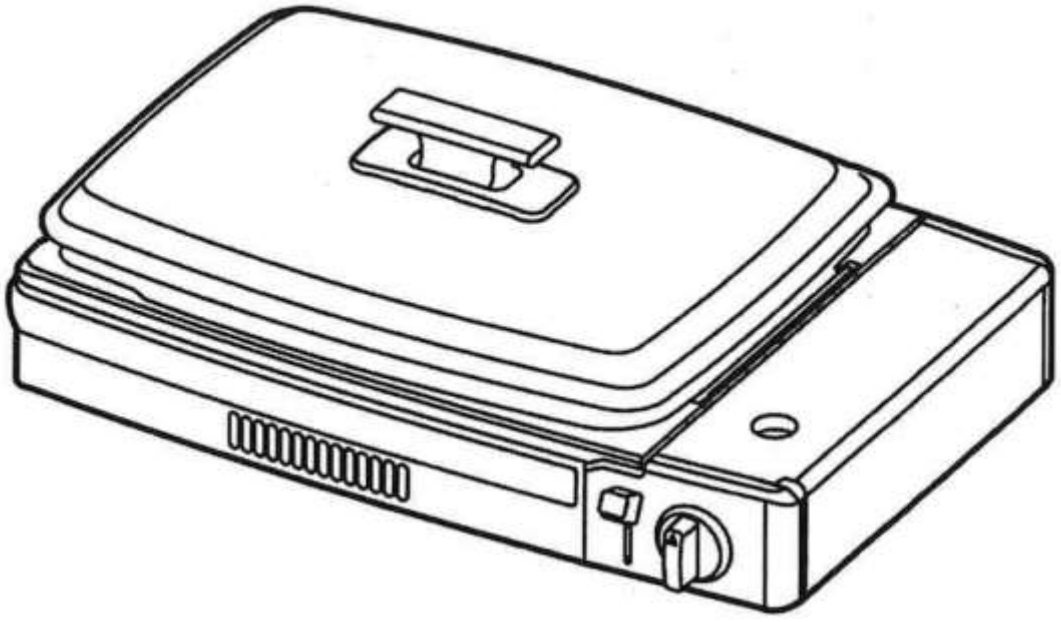
NOTE — The appliance shape shown is an example (only for reference).

FIGURE 9 PORTABLE GAS COOKER / PORTABLE GAS STOVE



NOTE — The appliance shape shown is an example (only for reference).

FIGURE 10 PORTABLE GRILLER



NOTE — The appliance shape shown is an example (only for reference).

FIGURE 11 PORTABLE HOT PLATE COOKER