

Answers to 9193 – 2005

ANSWER 1

ANY FOUR

- Check that chimney is sound and not obstructed.
- Check that the chimney draws correctly (no downdraughts).
- Seal fireplace with sheet of non combustible material.
- Fit a flue terminal of correct size.
- Chimney swept clear of soot.
- Discharge point of spigot.
- Angle of spigot.
- Remove or permanently fix damper open.

(4 marks)

Total 4 marks

ANSWER 2

(a) ANY FOUR

- 1 Isolation Valve
- 2 Gas Meter
- 3 Filter
- 4 Regulator
- 5 Relief Valve

(½ mark each)
(2 marks)

(b) Being **heavier than air** the LPG falls to **low levels**.

(2 marks)

(c) Overgassing and underaeration (lack of air).
High gas consumption.

(2 marks)

(d) **Vitiation:** the **contamination of the air supply** by products of combustion to a gas burner causing **incomplete combustion**.

(Definition: 2 marks)

Causing:

- Flame lift off
- Noise
- Unstable flame

(Causing: 2 marks)
(Total 4 marks)

(e) A **curved and sealed pressure tube** which, when pressurized, **tends to straighten (or deflect)**, and the amount of **movement of the attached needle indicates the pressure**.

(2 marks)

Total 12 marks

ANSWER 3

- (a) ANY TWO
 Diaphragm
 Rotary
 Vanes
 Roots
 Bellows
(2 marks)
- (b) ANY TWO
 Outlet pressure rises
 Regulator fails to shut off
 Gas will escape from breather
(2 marks)
- (c) To prevent unauthorised use of the bypass.
(2 marks)

Total 6 marks

ANSWER 4

- (a) Heat Input to room = $80 \times 0.36 = 28.8$ MJ/hr (1 mark)
Heat input to appliance = $28.8 / 0.7 = 41.1$ MJ/hr (1 mark)
Gas Rate = $41.1 \div 95 = 0.43$ m³/hr (1 mark)
(Total 3 marks)
- (b) ALL
1. Identify the working pressure from the data plate
2. Adjust the regulator to provide the working pressure
3. Turn on all burners fully
4. Time the flow through the meter
5. Calculate gas rate by using formula
(3 marks)
- (c) ANY TWO
1. Igniter or pilot too far from main burner ports
2. Pilot flame restricted
3. Main burner ports partially restricted.
4. Primary air ratio incorrect (air intake blocked)
5. Gas leak in appliance
(2 marks)

Total 8 marks

ANSWER 5

(a) A flue damper is used to control the flow of the exhaust from an appliance. This choking effect on the flue controls the operation of the appliance. (1 mark)

(b) ANY FOUR
 Natural
 Induced
 Forced
 Balanced
 Power
(½ mark each) (2 marks)

(c)
 Air gap
 Insulating material
(2 marks)

(d) Free-standing space heaters are required to be seismically restrained in case of earthquake. This must be carried out in accordance with manufacturer's specifications. (2 marks)

Total 7 marks

ANSWER 6

(a) ANY FOUR

- gas valve
- pressure regulator
- flame failure device
- igniter
- mercury switch

(½ mark each)(2 marks)

(b)

- Flue installed through roof
- Ventilation at high and low level
- Gas supply to appliance
- Firm, fireproof base to support heater

(4 marks)

(c) ANY FOUR

- Heater is smaller - takes up less space
- It is wall hung and avoids need for heavy duty base
- Higher overall efficiency due to reduced heat losses
- Provides continuous supply of hot water
- Some are able to provide different water temperatures at different outlets
- Fewer control valves required in HW line

(4 marks)

(d) ANY FOUR

- Manufacturer or supplier's name or trademark
- Appliance identification of type
- Appliance model number
- Type of gas for which appliance is suitable
- Gas pressure at which the appliance is designed to operate
- Input of appliance

(½ mark each) (2 marks)

(e) ANY SIX

- Rigidly mounted on a permanent structure
- Clearance or protection at back of heater
- In area of good ventilation, no overhangs
- Close as possible to major uses
- Clear of openings into building
- Clear of trees and other vegetation
- Clear of physical damage or with protection barrier
- Flue clear of neighbouring property
- Clearance from gas meter

(½ mark each) (3 marks)

ANSWER 6 (contd)

(f)

- Low level ventilation close to or below burner level
- High level ventilation
- Ventilators either directly to outside or from an adequately ventilated area.

(3 marks)

(g)

(i) **Overheat shut off**

Type: Bi-Metal

Purpose: To shut off gas if thermostat fails

(2 marks)

(ii) **Thermostat**

Type: Snap acting rod and tube

Purpose: Senses the water temperature and controls the gas to the burner

(2 marks)

(iii) **Flame Failure**

Type: Thermo-electric

Purpose: Monitors pilot flame and shuts all gas off if pilot goes out

(2 marks)

(h) ANY TWO

- Poor combustion leading to sooting in base of heater
- Poor flue gas dilution leading to overheating of the flue
- Possible spillage of combustion products into cupboard
- Poor heater efficiency
- Carbon monoxide present in flue gas

(2 marks)

Total 26 marks

ANSWER 7

(a)

1. Remove test point plug downstream of regulator
2. Connect pressure gauge downstream of regulator.
3. Adjust spring loading of reg to minimum.
4. Open inlet gas valve and purge pipe work through suitable point.
5. Carry out soundness test.
6. Turn the appliance on.
7. Adjust the reg until correct working pressure is indicated on gauge.
8. Turn off appliance and check lock up pressure.
9. Turn off isolating supply valve
10. Remove pressure gauge
11. Replace test point plug
12. Turn on isolating supply valve
13. Check test point for leaks

(½ mark each) (6 marks)

(b)

- A = Inlet gas filter
- B = Main burner pressure regulator
- C = Auto safety shut off valve, slow opening, fast closing
- D = Main burner flow rate control valve
- E = Pilot manual gas valve

(5 marks)

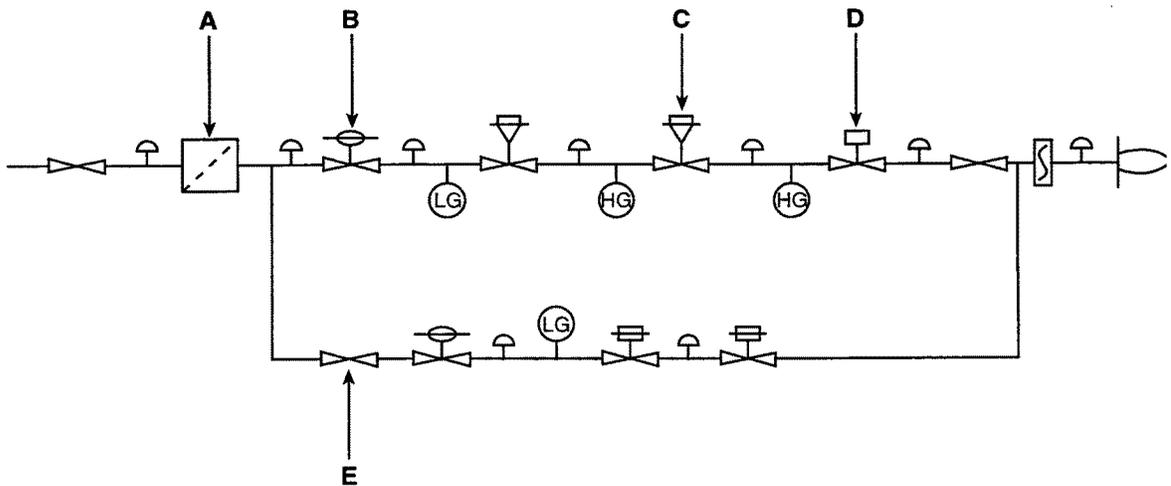


Fig. 1

Total 11 marks

ANSWER 8

(a)

- Craftsman Gasfitter with a current licence
- Holder of Exemption Certificate under clause 57 of PG&D Act

(2 marks)

(b)

- Propane
- Butane

(½ mark each)

(1 mark)

(c)

- (i) 25:1
- (ii) 10:1

(2 marks)

(d)

- Carbon dioxide
- Nitrogen

(½ mark each)

(1 mark)

(e)

- Lower limit **2% LPG in air**
- Upper limit **10% LPG in air**

(2 marks)

(f)

- (i) The combustion process produces water vapour, which condenses on cold surfaces.
- (ii) Increased ventilation will reduce condensation

(2 marks)

Total 10 marks

ANSWER 9

- (a) In a PIEZO igniter operation' a cam causes a spring-loaded striker to impact on a crystal, which generates a high voltage current. The voltage is then discharged across a gap that is positioned in a stream of gas. This causes ignition of the gas.

(5 marks)

- (b) A thermo-electric ffd is a thermo-couple that consists of two wires of different metals which when heated generate a current between the hot and cold junctions. This current holds the electromagnetic gas valve in the open position. If the flame goes out the hot junction cools, the current stops, and the gas valve closes.

(5 marks)

Total 10 marks

ANSWER 10

(a)

Smoke test

Either a smoke pellet is placed in the combustion chamber, or a smoke taper is held beside the DDD and with the appliance in full operation the flow of smoke is observed.

(1 mark)

Spillage test

A cold surface is held alongside the DDD and the condensation of water vapour indicates spillage.

(1 mark)

(b) Any FOUR:

- Wind direction,
- Turbulence and downdraught
- Proximity of people
- Clear of combustible material
- Proximity to openings
- Clear of abutments

(Any other from NZS 5261 : 2003, 2.6.13 acceptable)

(2 marks)

(c) Any TWO:

- Products of combustion can enter the circulating air
- The combustion can be upset leading to CO poisoning
- Could cause a fire
- Lockout on overheat switch

(2 marks)

Total 6 marks