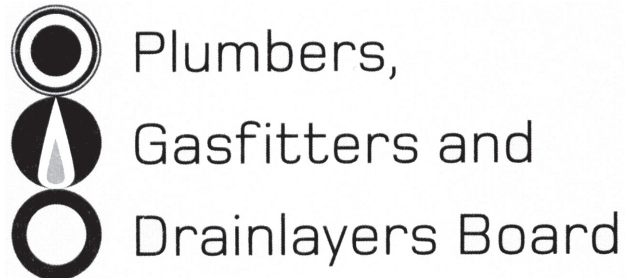


No. 9193



REGISTRATION EXAMINATION, NOVEMBER 2008
GASFITTING

ANSWER SCHEDULE

ANSWER 1

(a) Firm, fireproof base to support heater

Ventilation can be provided at both high and low level

Gas Supply can be provided to cupboard

Flue can be taken outside

Flue protection can be provided above heater

Seismic anchorage for heater to prevent tipping

Access for maintenance

Large enough to remove heater freely

(Any 6, ½ mark each) (3 marks)

(b) The type of gas available

That the gas supply is adequate to satisfy peak loading demands

That the capacity of the GMS or cylinder supply is sufficient to meet the required demand

The pressure of the gas available at the inlet to the consumer piping

The maximum pressure supplied by the GMS or cylinder in the event of failure of the regulator or control

Location of the GMS.

(Any 5, 1 mark each) (5 marks)

(c) Burner linted or otherwise restricted

Primary air restricted

Flames vitiated

Excessive pull on flue

Cracked radiant

(Any 4, 1 mark each) (4 marks)

Total 12 marks

ANSWER 2

(a) (i) For safety reasons – so that any escaping gas may be readily noticed and identified.
(1 mark)

(ii) LPG is heavier (more dense) than air. It could otherwise accumulate at low levels causing a potential hazard. The ventilation must terminate to an exterior position so as to avoid accumulation, potential sources of ignition, or entry back into the building.

(2 marks)

(b)

	LPG	Natural gas
Main constituent gases	Propane / Butane	Methane
Air / gas mixture ratio	25 to 1 approximately	10 to 1 approximately
Heat (calorific) value	102 MJ/m ³	40 MJ/m ³
Flammability range	2.4% to 9.5%	5% to 14%
Relative density	1.55	0.65

(½ mark per line) (2 marks)

(c) (i) Thermostat which directly controls the gas valve to the burner.
(2 marks)

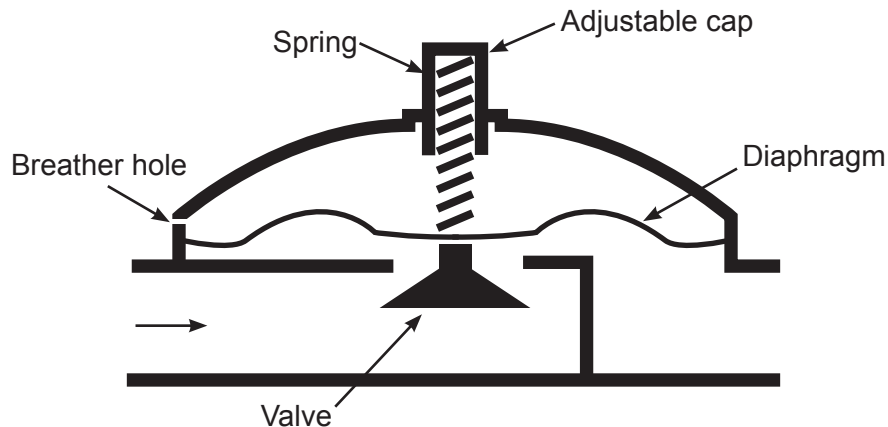
(ii) Thermostat which controls a motor, solenoid, or relay which in turn operates the valve on the burner.
(2 marks)

(iii) Thermostat which turns a control valve up or down to increase or decrease the supply of gas to the burner of a burner.
(2 marks)

Total 11 marks

ANSWER 3

(a)



(1 mark for Diaphragm, 1 mark for breather hole, 1 mark for spring, 1 mark for valve)

(½ mark each, 2 marks)

(b) (i) The flame becomes luminous, yellow, floppy and may be smoky and deposit soot.

(2 marks)

(ii) Volume – Decreases

Density – Increases

Pressure in closed system – Decreases

Change of state – May liquefy

(½ mark each, 2 marks)

(iii) At constant pressure the volume of a given mass of a gas increases or decreases by the same factor as its temperature increases or decreases.

(2 marks)

(iv) For a fixed amount of gas kept at a fixed temperature, pressure and volume are inversely proportional.

(2 marks)

Total 10 Marks

ANSWER 4

- (a) Volume of room = $4.0 \times 3.8 \times 2.7 = 41.04\text{m}^3$ (1 mark)
Heat input = $41.04 \times 0.36 = 14.77 \text{ MJ/h}$ (1 mark)
- (b) Heating rate = $4.5 \times 3.6 \text{ MJ/h}$
= 16.2 MJ/h (1 mark)
Gas input rate = $\frac{16.2\text{MJ/h}}{90 \text{ MJ/m}^3}$
= $0.18\text{m}^3/\text{h}$ (1 mark)
- (c) Volume = $D^2 \times 0.7854 \times L$
 $40\text{mm}^2 \times 0.7854 \times 12.5\text{m}$
 $0.04 \times 0.04 \times 0.7854 \times 12.5$ (1/2 mark)
= 0.0157m^3 (1/2 mark)
- Volume = $D^2 \times 0.7854 \times L$
 $20\text{mm} \times 0.7854 \times 28\text{m}$
 $0.02 \times 0.02 \times 0.7854 \times 28$ (1/2 mark)
= 0.0088m^3 (1/2 mark)
- Volume = $D^2 \times 0.7854 \times L$
 $10\text{mm} \times 0.7854 \times 10\text{m}$
 $0.01 \times 0.01 \times 0.7854 \times 10$ (1/2 mark)
= 0.001m^3 (0.0007854) (1/2 mark)
- Total = 0.0255m^3 of gas (1/2 mark)
- Heating value = $40 \times 0.0255\text{m}^3$ of gas
= 1.020 MJ m^3 (1/2 mark)

Total 8 Marks

ANSWER 5

- (a) (i) At least 1.5m from a doorway when the quick connect device is to be used for a space heater.
OR
At least 300mm above ground, or floor, if outside and positioned to prevent ingress of water and debris. (1 mark)
- (ii) Bedrooms
Bathrooms
Saunas
Spa rooms
Toilets
Hallways
Residential garages (½ mark each, 2 marks)
- (iii) Temperature: 15°C (1 mark)
Pressure: 1 atmosphere (101.3kPa at mean sea level) (1 mark)
- (b) (i) Welded joints shall be completed using an appropriate welding procedure. (1 mark)
- (ii) Capillary joints in copper pipe shall be prepared using purpose designed tools
OR
Purpose made proprietary fittings and excess flux should be removed after jointing. (1 mark)
- (iii) Compression fittings and flare fittings shall be used only where they are readily accessible for the nut to be tightened to make a gas-tight joint. (1 mark)
- (iv) Screwed fittings and unions shall be used only in readily accessible and ventilated locations. (1 mark)
- (c) (i) Metallic pipes shall be stored in such a manner that the potential for corrosion is minimized. (½ mark)
- Unloading, hauling, handling and installation of pipe shall be carried out with care to avoid damage to the pipe or protective coating. (½ mark)
- Stored. Polyethylene pipes shall be protected from direct sunlight or any other deteriorating affects. (½ mark)
- Handled. Unloading, hauling, handling and installation of pipe shall be carried out with care to avoid damage to the pipe or protective coating. (½ mark)
- (ii) Consumer piping in the ground shall be bedded on a firm compacted surface along its entire length. (1 mark)

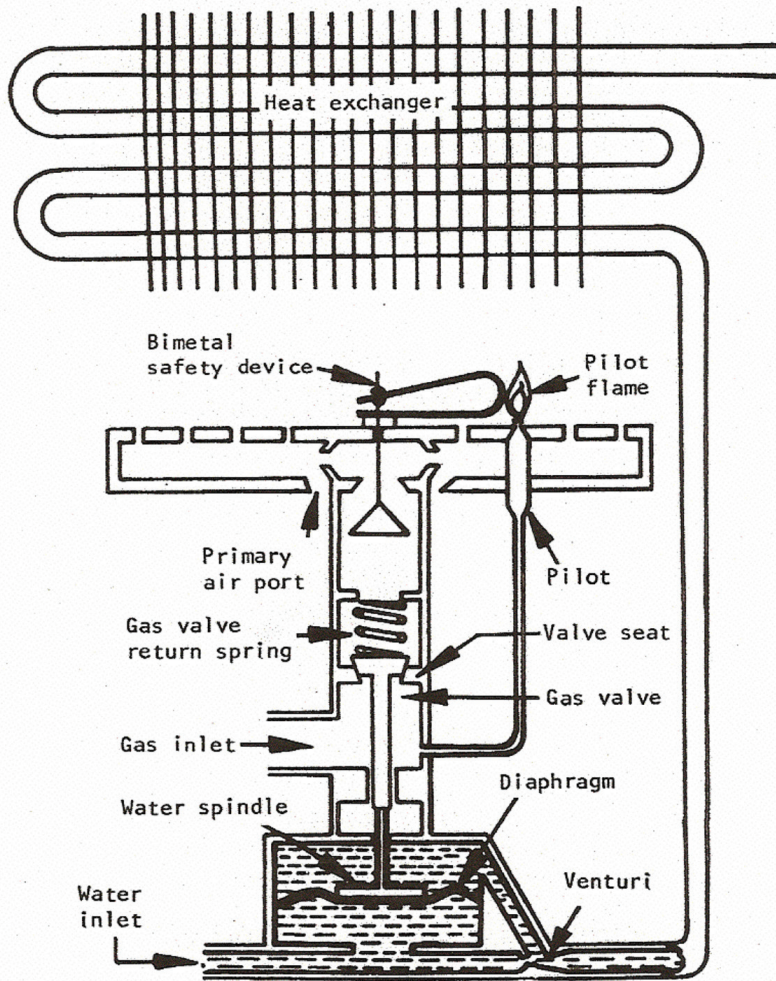
Total 12 Marks

ANSWER 6

- (a) The number of occupants
The activity of the occupants
Whether dust or fumes must be removed
Legislative requirements (4 marks)
- (b) Proximity to most frequently uses of hot water.
Position where flue can be installed safely
Adequacy of ventilation
Base of sufficient strength to support weight
Proximity to a drain
Availability of gas connection
Position of water connections
Structure to attach seismic restraint
Location (Any 6, ½ mark each) (3 marks)
- (c) Need to keep combustible material clear of heater and flue
Need to keep ventilators clear
Need to keep DDD clear
What to do if there is a smell of gas
How to recognise smell of gas
How to turn gas supply to heater off
Not to store any flammable material in cupboard
Not to store chemicals in cupboard (Any 5, 1 mark each) (5 marks)

Total 12 Marks

ANSWER 7



- (a) $\frac{1}{2}$ for gas diaphragm
 $\frac{1}{2}$ for gas valve
 $\frac{1}{2}$ for gas valve return spring.
 $\frac{1}{2}$ for heat exchanger
 $\frac{1}{2}$ for valve seat.
 $\frac{1}{2}$ for gas inlet.
 $\frac{1}{2}$ primary air port.
 $\frac{1}{2}$ for venturi.
 $\frac{1}{2}$ water inlet.
 $\frac{1}{2}$ water spindle. (5 marks)
- (b) (i) Water vapour (1 mark)
 Carbon dioxide (CO₂) (1 mark)
- (ii) Heavier than air (air is taken as 1) (1 mark)
- (iii) An instantaneous system has no storage capacity but uses a heat exchanger to transfer heat energy to the water as it flows through the water heater. (2 marks)

An indirect system utilizes heat produced by a separate process and passing this through a sealed coil or heat exchanger immersed in a body of water. The heat is transferred to the body of stored water ready for discharge off.

(2 marks)

Total 12 marks

ANSWER 8

(a) The functions of the Board shall be:

- To issue licences;
- To make arrangements for the examination of persons practising or intending to practise the plumbing or gasfitting or drainlaying trades;
- To present or issue, either independently or in conjunction with any other examining body, diplomas or certificates to any such person in recognition of his proficiency in any of those trades;
- To make recommendations to any person or body concerned with the education or training of any person wishing to enter the plumbing or gasfitting or drainlaying trades, or with regard to any other matter affecting such trades;
- To ensure that craftsmen gasfitters, gas inspectors, and registered gasfitters maintain an adequate level of competence in the field of work in respect of which they are registered;
- To exercise disciplinary powers in accordance with the provisions of Part IV of this Act;
- To institute prosecutions against registered persons or other persons for the breach of any Act or regulation relating to sanitary plumbing, gasfitting, or drainlaying;
- To make recommendations to the Minister with respect to the making of regulations under this Act, or the making of regulations controlling sanitary plumbing or drainlaying under the Health Act 1956.

(Any 5, 1 mark each) (5 marks)

- (b) (i)
- Exemption under PG&D Act for water work associated with a gas appliance
 - Registered plumber or craftsman plumber holding a current licence
 - Hold a current plumbing limited certificate and work under the supervision of a craftsman plumber.

(Any 1) (1 mark)

(ii) Acting under the authority of a Craftsman Gasfitter.

(1 mark)

- (iii)
- Provide adequate number of air changes to prevent contamination.
 - Assist in removal products of combustion.
 - Provide air for combustion

(Any 2, 1 mark each) (2 marks)

(iv) The PG&D Board, the certifier and the consumer.

(Any 2, ½ mark each) (1 mark)

Total 10 marks

ANSWER 9

- (a) Balanced flue:
Air for combustion drawn from outside
Products of combustion discharged outside
Appliance is sealed from the room.
Intake and discharge through common terminal

Open flue:
Air for combustion is drawn from room
Products are discharged outside
Flames are open to the room
Has a down draught diverter

Flueless:
Air for combustion is drawn from room
Products discharged into room
Flames are open to the room

(1 mark each) (9 marks)

- (b)
- Lack of oxygen through a lack of ventilation
 - Having undersized ventilation.
 - Flame chilling resulting from draught.
 - Flame lift off or under aeration
 - Blocked, partially blocked, undersized or incorrect installation of the flue.
 - Vitiation.

(Any 4, 1 mark each) (4 marks)

Total 13 marks

