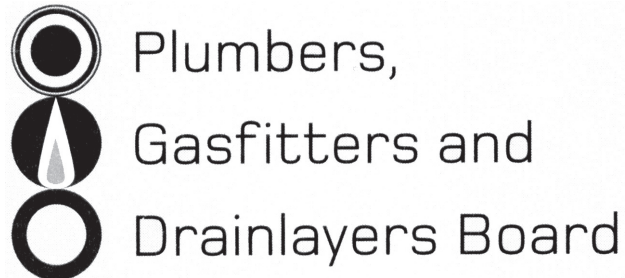


No. 9193



REGISTRATION EXAMINATION, NOVEMBER 2016
LICENSED GASFITTER

ANSWER SCHEDULE

ANSWER 1

- (a) (i) The thermocouple may not be able to generate sufficient voltage.
- (ii) The tip will be over-heated and shorten the life of the thermocouple. (2 marks)
- (b) • The button is manually depressed holding the valve open permitting gas flow
• The pilot is ignited.
• The button is held down.
• The pilot flame heats the thermocouple tip.
• Sufficient mV is generated to hold the valve against the electromagnet.
• The button is released.
• When the flame goes out the lack of heat stops mV generation.
• The spring pushes the valve closed stopping gas flow when insufficient mV is available to hold the valve open. (4 marks)
- Total 6 marks**

ANSWER 2

- (a) A current is passed through the thermistor. A controller measures the resistance.
As temperature increases so does the resistance of the thermistor. A thermistor is a temperature dependant resistor. (3 marks)
- (b) Vapour or liquid is in a bulb, probe or phial, when heated the vapour expands increasing the pressure within the phial and down a small capillary tube to expand a bellows pushing open a gas valve. (3 marks)
- (c) A steel rod is fixed at one end inside a copper or brass tube. The copper tube expands as it warms growing longer. The steel rod does not expand at the same rate as the copper tube and as it is fixed at one end to the copper it moves up and down the tube as the temperature changes. The rod was holding a valve open and when it moves away it allows the valve to close. (3 marks)
- Total 9 marks**

ANSWER 3

Any FOUR (1 mark each)

- Lack of oxygen through a lack of ventilation/having undersized ventilation.
- Flame chilling resulting from draught.
- Flame lift off or under aeration/ incorrect primary air adjustment.
- Blocked, partially blocked, undersized or incorrect installation of the flue.
- Vitiation.
- Over-gassed.
- Wrong gas type.

Total 4 marks

ANSWER 4

- (a) (i) Any TWO (1 mark each)
- Cross-linked polyethylene is degraded by UV light.
 - Cross-linked polyethylene is easily physically damaged.
 - Cross-linked polyethylene is more readily damaged by fire.
 - Cross-linked polyethylene cannot be installed in high temperature areas. (2 marks)
- (ii) Any TWO (1 mark each)
- Wrapping.
 - Sleeving.
 - Painting. (2 marks)
- (b) Any THREE (1 mark each)
- Available in long lengths (fewer joints).
 - Flexible and easy to handle.
 - Does not suffer from corrosion.
 - Cost effective.
 - Non-conducting material.
 - Less friction loss, therefore greater flow. (3 marks)

Total 7 marks

ANSWER 5

- (a) Any SIX (1 mark each)
- Leakage test.
 - Gas type.
 - Available pressure.
 - Meter/cylinder capacity.
 - Maximum possible over pressure.
 - Clearances for appliances.
 - Existing pipe material.
 - Flue Suitability.
 - Ventilation requirements.
 - Existing pipe size. (5 marks)
- (b) Volume of room = 19.2 m^3 (3 marks)
- Maximum heat input rating = $19.2 \times 3 \text{ MJ/h/m}^3 = 57.6 \text{ MJ/h}$ (1 mark) (4 marks)

Total 9 marks

ANSWER 6

(a) Any THREE (1 mark each)

- The pilot flame would burn lazy and yellow.
- The flame could generate soot.
- The pilot may not power the thermocouple enough and shut down.
- The appliance could light explosively.

(3 marks)

(b) Any THREE (1 mark each)

- The products of combustion would spill into the room via the front opening.
- The flame would become vitiated.
- Carbon dioxide would be generated/ incomplete combustion.
- Heat would spill from the front of the appliance damaging the appliance or activating the thermal fuse in the thermocouple.
- Water will not heat up adequately.

(3 marks)

Total 6 marks

ANSWER 7

(a) 1. Ensure other gas appliances are not operating.

2. Operate fire and set onto high.

3. Check the operating pressure is correct on the appliance.

4. Measure the consumption through the meter over a fixed time. e.g. volume /minute.

5. Calculate the hourly consumption in MJ.

(5 marks)

(b) • To avoid dangerous situations causing harm to people.

– Burns from incorrect water temperatures.

– Burners generating carbon monoxide and soot into occupied space.

• To avoid damage to appliances or flues and associated equipment.

– Burnt or sooted heat exchangers on appliances.

– Components becoming brittle or electronics malfunctioning due to excess heat.

• To avoid fire risk.

– Over temperature situations close to surrounding combustible materials.

• To avoid expensive running costs.

– High gas usage and inefficiencies.

– Under performance of appliances.

• To meet legal requirement.

– It is a legal requirement to commission gas appliances.

• To comply with manufacturers' instructions. (4 marks)

(c) Any TWO (1 mark each)

• Incomplete combustion, over-gassing and under-aeration (lack of air).

• The gas consumption will not match the data plate information.

• Damage to appliance.

(2 marks)

Total 11 marks

ANSWER 8

Fulcrum	K	Regulator loading spring	G
Orifice	B	Pressure relief spring	D
Filter	A	Breather	H
Diaphragm	C	Regulator adjustment screw	E
Excess relief valve	I	Regulator valve	L

(½ mark each)

Total 5 marks**ANSWER 9**

Atmospheric burner	Air for combustion is supplied by natural draught.
Forced draught burner	Air for combustion is mechanically introduced before the burner.
Induced draught burner	Air for combustion is drawn in as products of combustion are removed by a fan after the burner in a suction effect (negative pressure).

Total 3 marks**ANSWER 10**

(a) (i)

Name of test	Leakage test (½ mark)
Pressure of test	2 kPa or operating pressure whichever is greater (1 mark)
Time allowances for test	2 and 5 mins (½ mark)
Permitted pressure loss	0.20 kPa (1 mark)

(3 marks)

(ii)

Name of test	Gas tightness test (½ mark)
Pressure of test	14 kPa (1 mark)
Time allowances for test	2 and 5 mins (½ mark)
Permitted pressure loss	Nil (1 mark)

(3 marks)

(iii) Name of test	Pipework test (½ mark)
Pressure of test	7 kPa or 1.5 times operating pressure whichever is greater (1 mark)
Time allowances for test	2 and 5 mins (½ mark)
Permitted pressure loss	Nil (1 mark)

(3 marks)

(b) (i) 0.9 kPa (ii) 0 kPa (iii) 1.15 kPa (iv) 1.5 kPa

(4 marks)

Total 13 marks

ANSWER 11

(a) 101.3 kPa (1 mark)

(b) • 15°C
• At sea level (2 marks)

(c) • The pressure of the atmosphere pressing onto the earth's surface. (2 marks)

(d) • Temperature/weather
• Altitude (2 marks)

(e) Gauge pressure plus atmospheric pressure. (1 mark)

Total 8 marks

ANSWER 12

(a) Natural gas: rises (½ mark)
LPG: falls (½ mark)
Reasons: Natural gas is lighter than air (1 mark) (2 marks)

(b) Type of gas	Natural gas	LPG
Main constituent(s)	Methane	Propane and Butane
Relative density	0.65	1.6
Heating (calorific) value (MJ/m ³)	40	95
Volume of air required for combustion of 1 cubic metre of gas	10 m ³	25 m ³
Lower explosive limit (% gas in air)	5%	2%
Upper explosive limit (% gas in air)	15%	10%

(6 marks)

Total 8 marks

SECTION B

1. C Appliance heat output ÷ heat input.
2. B The bottom of the wok is impinging on the burner flame.
3. E Fan interlock.
4. B 2nd family.
5. D Natural draught appliances.
6. D Carbon dioxide.
7. A The burner injector size is correct.
8. D 900 mm.
9. C BS08C35 (buff).
10. E 600 mm.

Total 10 marks