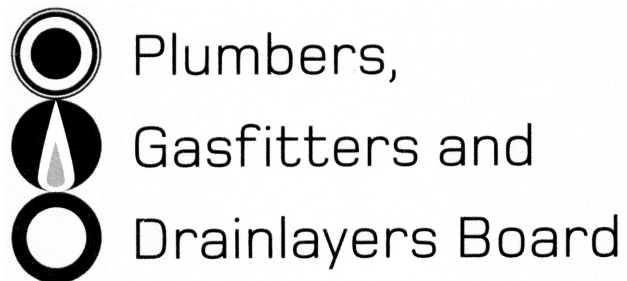


No. 9193



REGISTRATION EXAMINATION, NOVEMBER 2013
LICENSED GASFITTER

ANSWER SCHEDULE

ANSWER 1

(a) Solenoid Valve.

(½ mark)

(b)

| Letter | Name |
|--------|-----------------------|
| A | Solenoid coil |
| B | Electrical connection |
| C | Valve body |
| D | Spring |
| E | Plunger |
| F | Washer |
| G | Inlet |
| H | Valve seat |
| I | Outlet |

(4½ marks)

Total 5 marks

ANSWER 2

(a) (i) TEFFD Thermo electric flame failure device

(1 mark)

(ii) Sequence must include:

- The button is pushed / held manually.
- Small current is generated.
- Electromagnet holds valve open.

(3 marks)

(iii) Any ONE

- Space heater
- Cooker
- Hob
- Storage water heater
- Patio heater

(1 mark)

- (b) (i) Flame rectification flame failure system (1 mark)
- (ii) Sequence must include:
- Solenoid opens
 - AC passes through the flame, rectifying to DC.
 - DC passes through the earth circuit back to the control board.
- (3 marks)
- (iii) Any ONE
- Space heater
 - Cooker
 - Hob
 - Water heater
 - Patio heater
- (1 mark)
- Total 10 marks**

ANSWER 3

- (a) Any TWO (1 mark each)
- Oxygen depletion system is operating due to spillage.
 - Flue blocked.
 - Over-gased.
 - Fan faulty.
 - Over-temp faulty.
- (2 marks)
- (b) Any FOUR (1 mark each)
- No gas / lack of pressure.
 - Flame sensor faulty / flame sensor lead faulty.
 - Control board faulty.
 - Bad earth.
 - Solenoids in the unit faulty.
 - Injectors blocked.
- (4 marks)
- Total 6 marks**

ANSWER 4

- Any TWO (1 mark each)
- Maintain constant pressure.
 - Shut off gas supply (lock up).
 - Relieve excess pressure.
 - Reduce pressure.
- Total 4 marks**

ANSWER 5

- (a)
- Rod and tube
 - Storage water heater
 - Bimetallic
 - Central heating system
 - Liquid expansion
 - Oven, cooker, space heater, deep fryer
 - Thermistor
 - Space heater, continuous flow water heater
- (8 marks)
- (b) Any THREE (1 mark each)
- Flame failure
 - Tip over switch
 - Oxygen depletion device
 - Over heat device
- (3 marks)

Total 11 marks

ANSWER 6

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-gased.
- Wrong gas type.
- Dirty / blocked injectors.

Total 4 marks

ANSWER 7

- (a)
- Ensure the installation stays pressurised.
 - Isolate the appliances one at a time until the leak is isolated.
 - Using a sniffer or a soapy water solution spray the suspected area.
- (3 marks)
- (b) Any THREE (1 mark each)
- Temperature appliances cooling after use.
 - Atmospheric conditions change.
 - Pipe installation is being tampered with during the test.
 - Faulty test equipment.
- (3 marks)
- (c)
- Atmospheric conditions changing.
 - The supply regulator is letting by.
 - Temperature changing.
- (2 marks)

Total 8 marks

ANSWER 8

- (a) Natural gas: Rises and dissipates as it is lighter than air.
LPG: Sinks and accumulates as it is heavier than air.

(4 marks)

| | | | |
|-----|---|------------------|----------------|
| (b) | Type of gas | Natural Gas | LPG |
| | Main constituent(s) | Methane (Ethane) | Propane Butane |
| | Relative density | 0.6 | 1.6 |
| | Heating (calorific) value (MJ/m ³) | 40-42 | 95 |
| | Volume of air required for combustion of 1 cubic metre of gas | 10 | 25 |
| | Lower explosive limit (% gas in air) | 5 | 2 |
| | Upper explosive limit (% gas in air) | 15 | 10 |

(6 marks)

Total 10 marks

QUESTION 9

- (a) Any TWO (1 mark each)

- Polyethylene is degraded by UV light.
- Polyethylene is easily physically damaged.
- Polyethylene is more readily damaged by fire.

(2 marks)

- (b) Any THREE (1 mark each)

- Available in long lengths (fewer joints).
- Flexible and easy to handle.
- Does not suffer from corrosion.
- Non-conducting material.
- Less friction loss therefore greater flow.
- Colour identified.

(3 marks)

- (c) Any TWO (1 mark each)

- Wrapping.
- Sleeving.
- Painting.

(2 marks)

Total 7 marks

QUESTION 10

- (a) Meaning: The pressure in the system when the system is at rest with no appliances operating.

Place where measured: Test at any point between the service regulator and the appliance control valve.

(2 marks)

- (b) Meaning: The pressure in the pipe-work when at least one appliance is operating.

Place where measured: Test at any point between the service regulator and the appliance control valve

(2 marks)

- (c) Meaning: The operating pressure of the appliance when the appliance is in use.

Place where measured: Downstream from the appliance regulator, or at the appliance test point.

(2 marks)

Total 6 marks

QUESTION 11

Appropriate drawing (1 mark)

Drawing of appropriate device to include (½ mark each)

- Combustion fan.
- Room circulation fan.
- Heat exchanger.
- Room air return.
- Room air flow.
- Flue.
- Burner.
- Sealed combustion pathway.
- Sealed room air pathway.
- Furnace cabinet.

Total 6 marks

QUESTION 12

(a) Vol of cylinder
 $= 3.142 \times 0.3^2 \times 1.5$ (1 mark)
 $= 0.4242 \text{ m}^3$ (1 mark)

Vol of flue
 $= 3.142 \times 0.06^2 \times 1.5$ (1 mark)
 $= 0.0170 \text{ m}^3$ (1 mark)

Storage capacity of the cylinder
 $= 0.4242 - 0.0170 = 0.4072 \text{ m}^3$ (1 mark)
 $= 0.4072 \times 1000 = 407 \text{ litres}$ (1 mark)

(6 marks)

(b) 447 kg (or the answer from (a) + 40 kg) (1 mark)

Total 7 marks

SECTION B

- 1 A Excess flow device
- 2 C $40,000 \text{ mm}^2$
- 3 D $(101.3 + \text{supply pressure}) \div 101.3$
- 4 E CH_4
- 5 D Mercaptan.
- 6 A C
- 7 A Burner injector sizes.
- 8 E 2000 mm
- 9 A 36.9 MJ
- 10 B 10 m
- 11 D 450 mm
- 12 C 7.0 kpa
- 13 D Biogas.
- 14 B 2 m .
- 15 D 1.2 m .
- 16 E 1500 mm .
- 17 A 10 MJ/h
- 18 D 3.5 m

Total 18 marks