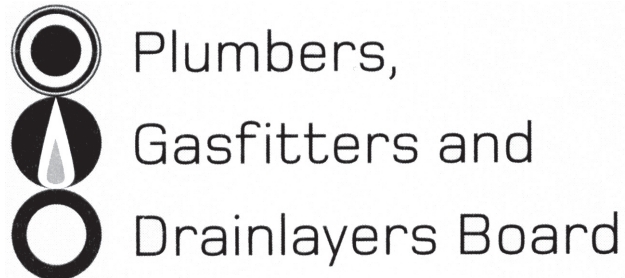


No. 9196



CRAFTSMAN EXAMINATION, JUNE 2008
GASFITTING

ANSWER SCHEDULE

ANSWER 1

- (a) 1 100% of the upstream regulator inlet pressure
- 2 Where over pressure protection is fitted the maximum over pressure likely to occur when the upstream regulator fails
- 3 Where no upstream regulator is fitted the maximum allowable operating pressure of the section of the network supplying the installation.

(3 marks)

- (b) (i) 25mm
- (ii) 25mm
- (iii) 500mm
- (iv) 100mm
- (v) 100mm
- (vi) 100mm

(½ mark each) (3 marks)

Total 6 marks

ANSWER 2

a) ANY FIVE

- 1 Pipe can be protected from damage
- 2 Prevent hazardous build up if leakage occurs
- 3 Not prejudice egress or emergency response
- 4 Sufficient clearance from other services to be maintained and operated safely
- 5 When passing through a wall or floor avoids escaping gas passing from one space to another
- 6 Can be supported to prevent stress due to earthquake, vibration and thermal effects

(1 mark each) (5 marks)

b) Any SIX:

- 1 Rated energy input of appliance
- 2 Adventitious ventilation available
- 3 Whether directly to outside or from an adjacent space (ventilation)
- 4 Close as possible to appliance (ventilation)
- 5 Vents in position where not likely to be blocked
- 6 Positioned where uncontaminated air is available
- 7 Louvres if fitted to be downward facing
- 8 Vent must not penetrate a fire separation
- 8 Impact of any mechanical air moving devices
- 9 Air for D.D.D. and combustion must be from same air space as appliance.

(½ mark each) (3 marks)

c) Must have readily accessible and identifiable isolation located in same room or space as the appliance.

(2 marks)

Total 10 marks

ANSWER 3

(a) $0.05 \times 6 \times 3600 = 1080$ (1 mark)

$0.15 \times 2 \times 3600 = 1080$ (1 mark)

$0.05 \times 4 \times 3600 = 720$ (1 mark)

$= 2880 \text{ l/hr}$ (1 mark)

Temperature rise $65^\circ - 5^\circ = 60^\circ$ (1 mark)

Therefore four heaters will be required to be manifolded together. (1 mark)

(b) $4 \times 55.3 \times 3.6 = 796 \text{ MJ/hr.}$ (1 mark)

(c) Pressure drop = $0.275 \div 30$
= 0.0092 kPa/m.

Pipe diameter is to be 40mm. (2 marks)

(d) A temperature limiting valve is required.

To meet the requirements specified in the Building Code. (1 mark)

Total 10 marks

ANSWER 4

(a) Index length = 79 m (½ mark)

Allowable pressure drop = 2 kPa (½ mark)

Pressure drop per metre = $2 \div 79 = 0.0253 \text{ kPa/m.}$ (½ mark)

Gas load = 1338 MJ (½ mark)

Pipe size = 32 mm. (1 mark)

(b) Index length = 52 m.

Total gas consumption = 1338 MJ/hr

Pipe section	Straight pipe length (m)	Number of fittings	Corrected length (m)	Gas input in MJ/h	Pipe diameter
B-C	9	3	12	1338	40
C-D	6	2	8	1108	40
D-E	9	3	12	878	40
E-F	6	2	8	648	32
F-G	9	4	13	418	32
G-H	13	4	17	188	26
G-I	7	3	10	230	26
F-J	7	5	12	230	26
E-K	7	4	11	230	26
D-L	7	3	10	230	26
C-M	9	6	15	230	26

(1 mark per line) (11 marks)

Total 17 marks

ANSWER 5

- 1 Check Installation instructions accompanying
- 2 Check Data Plate information
- 3 Appliance is free from internal leakage
- 4 Appliance is rigid and stable
- 5 Appears designed and constructed in a manner that will ensure safe operation
- 6 Has flame failure safeguard on the oven
- 7 The oven has a clear flue
- 8 Oven thermostat is operating
- 9 Primary air intakes are clear
- 10 The flames appear normal
- 11 There is complete and rapid ignition at all burner ports
- 12 The external surface temperatures are not hazardous
- 13 Trivets and all other loose parts are present
- 14 Not excessively corroded
- 15 Suitable for the type of gas supplied
- 16 Check ES website

(Any 8 – ½ mark each) (4 marks)

Total 4 marks

ANSWER 6

(a) Any FOUR:

- 1 Burners and pilots at least 450 mm above floor level
- 2 450 mm high bund wall around appliance
- 3 Garage provided with high and low level permanent ventilation
- 4 Appliance protected against physical damage
- 5 Warning notice about flammable vapours affixed

(Either of above) (1 mark)

(3 marks)

- (b)
- 1 Isolate the appliance
 - 2 Isolate the gas supply
 - 3 Pressurise the pipework to at least 1½ times working pressure or 7kPa whichever is greater
 - 4 Allow time for stabilisation
 - 5 Monitor pressure loss over time
 - 6 Re-connect and test connections
- (3 marks)

(c) Any FIVE:

- 1 Aeration of burner
 - 2 Pull on flue
 - 3 Ventilators in place
 - 4 Appliance clear of combustibles
 - 5 On a firm base
 - 6 Seismic restraint fitted
 - 7 Safety devices operate
 - 8 Correct type of gas for appliance
- (5 marks)

- (d)
- 1 Number/type of appliances/outlets supplied
 - 2 Location of Heater outlets
 - 3 Standard of living and habits of occupants
 - 4 Layout of system and likely losses
 - 5 Winter water and air temperatures
 - 6 Number of occupants

(½ mark each) (3 marks)

Total 15 marks

ANSWER 7

(a) $A = 150 \times 1050 \times 3.6$ (1 mark)
 $= 567000\text{mm}^2$ (1 mark) (2 marks)

(b) $A = (150 \times 1050 \times 3.6) + (150 \times 510)$ (1 mark)
 $= 567000 + 76500$ (1 mark)
 $= 643500\text{mm}^2$ (1 mark) (3 marks)

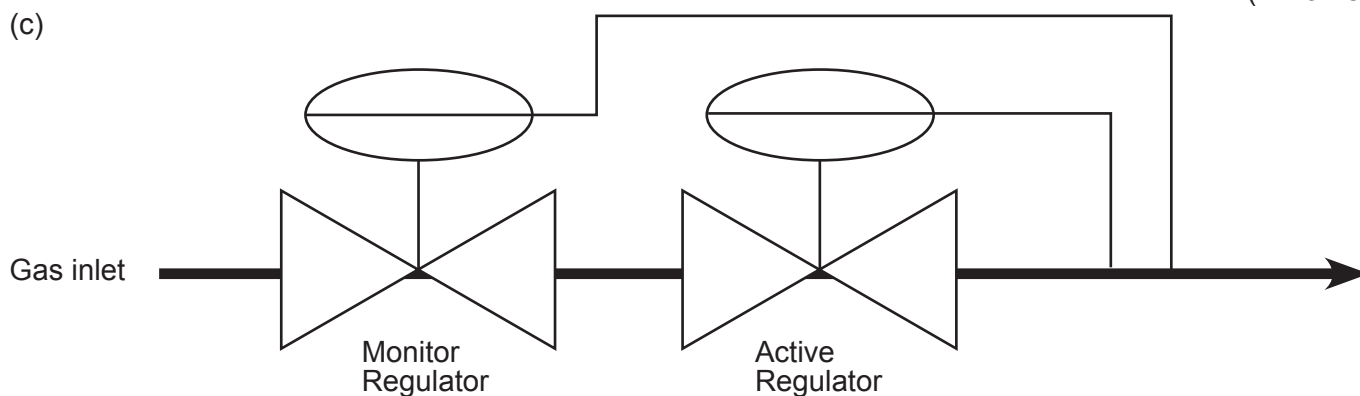
- (c) (i) Two
(ii) One at high level and one at low level
(iii) Each individual opening must have a minimum free area of 643500mm^2 . (3 marks)

Total 8 marks

ANSWER 8

(a) A zero pressure regulator is used on an air blast burner to reduce gas pressure to atmospheric pressure prior to aspiration by air at pressure. (2 marks)

(b) A pilot operated regulator is used for high flow conditions and where fine control of downstream pressure is required. (2 marks)



(General layout – 1 mark), (Position of impulse lines – 1 mark), (Direction of flow – 1 mark), (3 marks)

(d) Any TWO:

- 1 Regulator/Relief valve positioned in a poorly ventilated area
- 2 Regulator/Relief valve positioned under an overhang
- 3 Regulator/Relief valve located close to an ignition source.
- 4 Discharge could enter a building. (1 mark each) (2 marks)

Total 9 marks

ANSWER 9

- (a) 150mm diameter and 5-500m high
175mm diameter and 2-250m high (4 marks)
- (b) (i) Any lateral run in a flue shall be as short as possible and not exceed 50% of the total flue height.
(ii) 75mm (2 marks)
- (c) 1 Excessive heat loss reduces the motive force of the flue products
2 Causes condensation. (2 marks)

Total 8 marks

ANSWER 10

- (a) (i) An air curtain is a type of direct fired air heater (1 mark)
(ii) positioned above or at the side of a doorway (1 mark)
(iii) A fan blows hot products of combustion over the opening to form a barrier to prevent cold air entering through the opening. (2 marks)
- (b) A fan in the base of the unit blows air over a heat exchanger and out through the top of the appliance. The outlets can usually be directed in various directions. An automatic gas burner fires into the heat exchanger and the products are discharged to atmosphere through a flue. (4 marks)
- (c) Heater outlet must be tested for:
Carbon monoxide level (CO level).
Carbon dioxide level (CO₂ level). (2 marks)

Total 10 marks

ANSWER 11

Stage	Purpose for Stage
Pre-purge	Prove air supply, purge combustion chamber
Start gas flame ignition	Pilot gas ignited by ignition sparking
Start gas flame proving	Pilot flame sensed with ignition off
Main burner run	Main burner alight
Lockout	Shut down, requires manual intervention to restart

(1 mark for each correct purpose) (5 marks)

Total 5 marks

