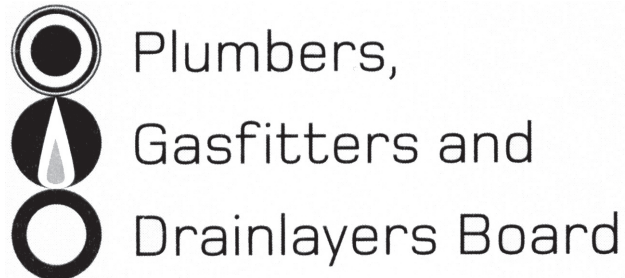


No. 9196



CRAFTSMAN EXAMINATION, NOVEMBER 2007
GASFITTING

ANSWER SCHEDULE

ANSWER 1

- (a)
- 1 Protect people from fire, explosions, oxygen depletion, noxious gases and other injury
 - 2 To protect property from damage

(2 marks)

(b) Any TWO:

- 1 NZS 5621:2003 part 2
- 2 NZS 5621:2003 part3
- 3 AS 5601
- 4 AG 601
- 5 Any means of compliance demonstrated to meet or exceed the performance criteria of Part 1

(2 marks)

(c) Any TWO:

- 1 Portable or mobile gas appliances where the gas bottle is integral to the appliance
- 2 Automotive use (propulsion)
- 3 CNG compressers and refueling stations
- 4 Installations above 700kPa.

(2 marks)

(d) Any THREE:

- 1 To avoid leakage of contents
- 2 To avoid contamination of contents
- 3 To avoid adverse interaction with other piping and electrical systems
- 4 To avoid people having contact that could cause harm
- 5 To avoid affecting the structural integrity of the building.

(3 marks)

Total 9 marks

ANSWER 2

(a) Any TEN:

In a well ventilated area

Able to be mounted on a secure structure

Clear of trees and other vegetation

Protected from severe winds and weather

Protected from physical damage

Clear of openings into building

Accessible for maintenance

Closeness to water feed and major draw off points

Flue outlet away from neighbours property or other flues

Clearance from gas meter or cylinder installation

Weatherproof power point

Manufacturers instructions

Proximity of electrical equipment

(Any ten, ½ mark each) (5 marks)

(b) Any FOUR:

Keep the area around the heater clear

Have the appliance serviced regularly

What to do if you smell gas

How to turn off gas in an emergency

How to turn off water and power supply

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

(c) Any TWO:

Not fitted underneath projecting shelves or cupboards

Clearance from side walls of 150mm

Flue terminal not less than 600mm below ceiling

(2 marks)

Total 10 marks

ANSWER 3

$$(a) \quad \frac{90 \times 4 \times 3.6 \times 100}{83}$$

$$= \frac{129600}{83}$$

$$= 1561.45 \text{ MJ}$$

(2 marks)

$$(b) \quad \text{Index length} = 2 + 90 + 15 + 25 + 3$$

$$= 135\text{m}$$

(1 mark)

$$\text{Pressure drop} = \frac{0.2}{135}$$

$$= 0.001482 \text{ KPa/m}$$

(1 mark)

Pipe section	Length (m)	Gas flow (MJ/h)	Pipe size (mm)
A – B	19	250	32 or 40
B – C	5	1561	65
B – D	20	250 + 1561 = 1811	80
D – E	15	250 + 250 + 1561 = 2061	80
E – F	2	2061 + 250 + 250 = 2561	100
E – G	105	250 + 250 = 500	50
G - H	28	250	32 or 40

(1 mark for each pipe size – 7 marks)

Total 11 marks

ANSWER 4

- (a) $15 \times 3.6 = 54$
 $12 \times 3.6 = 43.2$
 $18 = 18$
 $58 \times 3.6 = 208.8$
 $28 = 28$

($\frac{1}{2}$ mark for each conversion, $\frac{1}{2}$ mark for the two not required to be converted)

352 MJ/hr

$$352 \times 0.8 = 281.6 \text{ MJ/hr}$$

(1 mark)

$$\frac{281.6}{52} = 5.415$$

($\frac{1}{2}$ mark)

6 cylinders will be required

($\frac{1}{2}$ mark) (4 marks)

- (b) 6 cylinders should be kept in reserve

(1 mark)

- (c) Type of gas being used

Inlet or upstream pressure

Outlet or down stream pressure

Maximum flow anticipated

Size of pipework

(5 marks)

Total 10 Marks

ANSWER 5

(a) $6.3 \times 1.2 \times 2.4 \times 0.4 = 7.257\text{MJ/hr}$ (1 mark)

$\frac{7.257}{3.6} = 2.016\text{kW}$ (1 mark)

(b) Must be room sealed (2 marks)

Must be open flued with a flame safeguard and the room provided with permanent ventilation irrespective of the heater rating.

(2 marks)

(c) Any FIVE:

Stabilising device to prevent tilting

Chain to restrain cooker

Hose hangs in a loop without damage

Safety shut off valve on rigid pipework before hose

Oven flue outlet not restricted

Minimum clearance from combustible material

Hose and connections have approval rating.

(5 marks)

(d) (i) Room volume = $5.0 \times 7.5 \times 3.0 = 112.5\text{m}^3$ (1 mark)

Heat input to the room = $112.5 \times 0.36 = 40.5\text{MJ}$ (1 mark)

Heat input to the appliance = $40.5 \div 0.7 = 57.86\text{MJ}$ (1 mark)

(ii) Gas rate = $57.86 \div 42 = 1.38\text{m}^3/\text{h}$ (1 mark)

Total 14 Marks

ANSWER 6

$$P1 \times V1 = P2 \times V2$$

$$V2 = P1 \times V1 \div P2 = (20 + 101.3) \times (3000 \div 101.3)$$

$$= 121.3 \times (3000 \div 101.3)$$

$$= 121.3 \times 29.615 = 3592.306\text{m}^3$$

(1 mark each for last three lines, 1 mark for transposition of formula)
(2 marks)

Total 4 marks

ANSWER 7

(a) Any FIVE:

Check that the chimney is swept clean of soot and other loose material

Adequately sized

Sound and free from air leaks

Dampers removed or locked open

Not to be used for any loose material to collect without obstructing flue

Not susceptible to down draughts

No combustible materials in chimney

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

(b) Burner injector too large

Burner pressure too high

(½ mark each) (1 mark)

Total 6 marks

ANSWER 8

- (a) Room volume is $7.6 \times 5.6 \times 2.7 = 114.91$ (½ mark)
- Output rate $= \frac{392}{114.91}$ (½ mark)
- $= 3.41 \text{ MJ/hr/m}^3$ (½ mark)
- (0.41MJ too much)
- Therefore ventilation must be provided (½ mark)
- (2 marks)
- (b) $A = 300 \times 392$
- $= 117600\text{mm}^2$ (1 mark)
- (c) At both high and low levels relative to the room
- Each should be 117600mm^2 (2 marks)

Total 5 marks

ANSWER 9

- (a) (i) Natural draught radiant burner requires gas at pressure and inspirates the primary air
- (ii) Forced draught nozzle mix burner requires pressurised air and pressurised gas
- (iii) Air blast burner requires pressurised air and the gas is aspirated at zero pressure (3 marks)
- (b) (i) The two mix before the burner and combustion takes place with secondary air at the burner
- (ii) The two mix in the nozzle of the burner
- (iii) The two mix in the aspirator and no air is needed for total combustion 3 marks
- (c) Any THREE:
- 1 Loss of gas supply
 - 2 Flame failure
 - 3 Loss of air flow
 - 4 Back pressure due to flue blockage
 - 5 Loss of power

(Any 3, 1 mark each), (3 marks)

Total 9 marks

ANSWER 10

(a) Any FOUR:

Insulate flue

Protect flue from exposed area

Select shortest route to atmosphere

Avoid offsets/lateral runs

Increase flow with greater dilution

Material the flue is made of

(Any four), (4 marks)

(b) It can be reduced by either increasing ventilation to replace the moist atmosphere with drier, fresh air, OR replacing with a flued appliance.

(1 mark)

(c) Any TWO:

The flue can be sleeved with 25mm gap and the sleeve ventilated

The timber can be shielded from the flue by an insulation material

The flue can be spaced a safe distance from timber

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

(d) Any TWO:

Location of the flue.

Materials.

Insulation of the flue.

(1 mark)

(e) Any TWO:

Increase flue diameter.

Increase bend radius.

Increase lateral gradient.

(2 marks)

(f) (i) Approx. 50% excess air

(ii) Approx. 100% dilution air

(2 marks)

Total 12 marks

ANSWER 11

(a) When the vents are all from the same appliance (1 marks)

(b) $50 \times 50 \times 0.7854 = 1963.5$ (1 mark)

$40 \times 40 \times 0.7854 = 1256.64$ (1 mark)

$= 3220.14\text{mm}$ ($\frac{1}{2}$ mark)

Therefore diameter $= \sqrt{\frac{3220.14}{0.7854}}$ (1 mark)

$= \sqrt{4100}$

$= 64.03\text{mm}$ ($\frac{1}{2}$ mark)

65mm vent pipe required

(4 marks)

Total 5 Marks

ANSWER 12

Any TEN:

Located outside

Not buried below ground

Positioned upright on a firm base

If enclosed then high and low level ventilation provided

2 metres away from an ignition source

Located to avoid flooding

Protected from impact damage by vehicles, etc

Secured to prevent toppling

1 metre horizontally clear of openings into building

At least 3 metres away from combustible materials

Accessible (for change-over or emergencies)

(Any ten, $\frac{1}{2}$ mark each)

Total 5 marks

