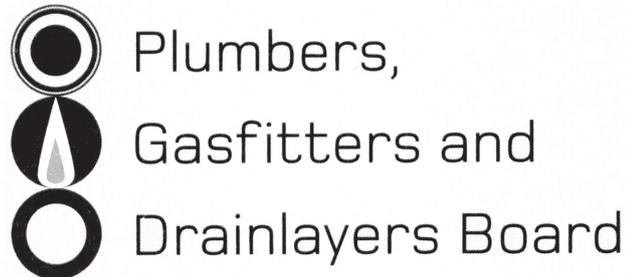


Affix label with Candidate Code
Number here.
If no label, enter candidate
Number if known

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No. 9196



REGISTRATION EXAMINATION, NOVEMBER 2011

CERTIFYING GASFITTER

QUESTION AND ANSWER BOOKLET

Time allowed **THREE** hours

INSTRUCTIONS

Check that the Candidate Code Number on your admission slip is the same as the number on the label at the top of this page.

Do not start writing until you are told to do so by the Supervisor.

Total marks for this examination: 100.

The pass mark for this examination is 60 marks.

Write your answers and draw your sketches in this booklet. If you need more paper, use pages 20–21 at the back of this booklet. Clearly write the question number(s) if any of these pages are used.

All working in calculations must be shown.

Candidates are permitted to use the following in this examination:

Drawing instruments, approved calculators, document(s) provided.

Publications, Acts, Regulations, Codes of Practice, or Standards other than the ones provided are NOT permitted in the examination room.

Check that this booklet has all of 21 pages in the correct order and that none of these pages is blank.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION

Candidates that sat this examination in November 2011 were provided with the following documents:

- NZS 5261 Gas installation
- NZS 5428
- Resource Booklet (appended to this booklet)

SECTION A

QUESTION 1

NZS 5261 Gas Installation states that an aluminium flexible flue can be used as a chimney liner for a gas appliance flue.

- (a) Give TWO reasons for using a flue liner inside a chimney instead of using the chimney as the flue.

1 _____

2 _____

(2 marks)

- (b) Give TWO situations in which having a flue liner inside of a chimney is NOT recommended.

1 _____

2 _____

(2 marks)

Total 4 marks

QUESTION 2

- (a) Two in-situ fill 45 kg cylinders are to be installed on the external wall of a house. The customer has requested the cylinders be located below an openable window.

Referring to NZS 5261 Gas Installation, state the minimum clearance below the window required for the cylinders' valves.

(1 mark)

- (b) (i) State the condition under which a Site Location Certificate is required for LPG.

(2 marks)

- (ii) A changeover regulator which has a 20 mm vent terminal is to be installed on the wall between the two cylinders.

Referring to NZS 5261 Gas Installation, state the minimum clearance below the window required for the vent terminal.

(1 mark)

- (iii) If the clearance in (ii) cannot be achieved, give a solution that does not include changing the regulator location or altering the window.

(1 mark)

QUESTION 2 (cont'd)

- (c) Sketch a diagram showing an LPG auto changeover two stage regulator station to suit the cylinders. Include all main components of the flexible cylinder connections, auto changeover regulator and installation requirements for the cylinders and regulator. Do not include clearances.

(8 marks)

Total 13 marks

QUESTION 3

- (a) A fault has developed on a power flued gas appliance. The appliance starts up correctly, but after it has been running for half an hour goes out on overheat.

Give FOUR likely reasons for the fault.

- 1 _____
- 2 _____
- 3 _____
- 4 _____

(4 marks)

- (b) A fault has developed on a gas-fired, electronic continuous-flow water heater. When the water tap is turned on, the appliance starts and the gas ignites, but the appliance shuts down after a few seconds. An error code is displayed which indicates failed ignition.

Give FOUR reasons for the fault to occur.

- 1 _____
- 2 _____
- 3 _____
- 4 _____

(4 marks)

Total 8 marks

QUESTION 4

- (a) A natural gas appliance has an efficiency of 80%.

The test dial on the gas meter connected to this appliance completes one revolution in 1 minute 10 seconds.

The test dial on the meter is marked 0.05 m³ per revolution.

The heating value (HV) of natural gas is 40 MJ/m³.

1 kW is equivalent to 3.6 MJ/hr.

Calculate, in kW, the energy output for the appliance.

Formula:

$$\text{Gas rate in MJ/hr} = \frac{\text{volume} \times \text{HV} \times 3600}{\text{time taken in seconds}}$$

(5 marks)

- (b) State how the amount of energy passed during one revolution of the test dial would change if the meter used in (a) was measuring LPG.

(1 mark)

Total 6 marks

QUESTION 5

The diagram on the opposite page shows the kitchen plan view and an in-wall manifold pipe elevation for an installation.

The kitchen plan view shows the position of appliances located on both sides of the wall. The in-wall elevation shows different points in the pipework labelled A – R.

The gas manifold pressure is to be supplied at 10% above the highest operating pressure required by the appliances.

The manifold is to be constructed of copper.

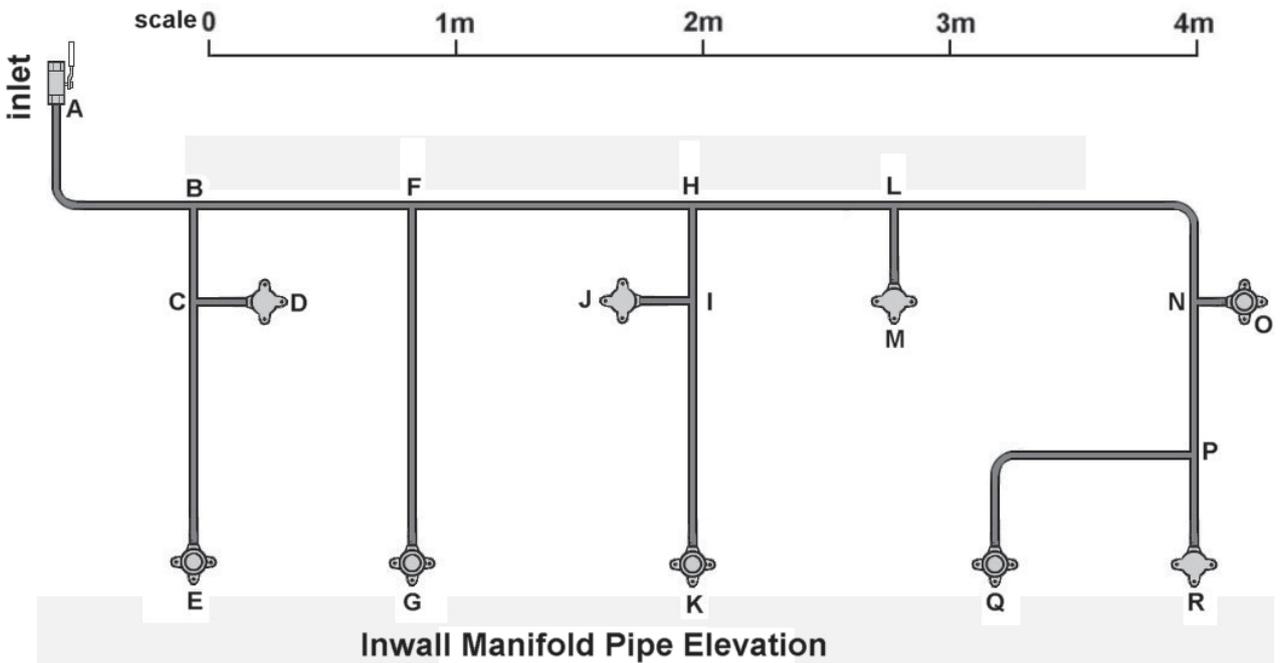
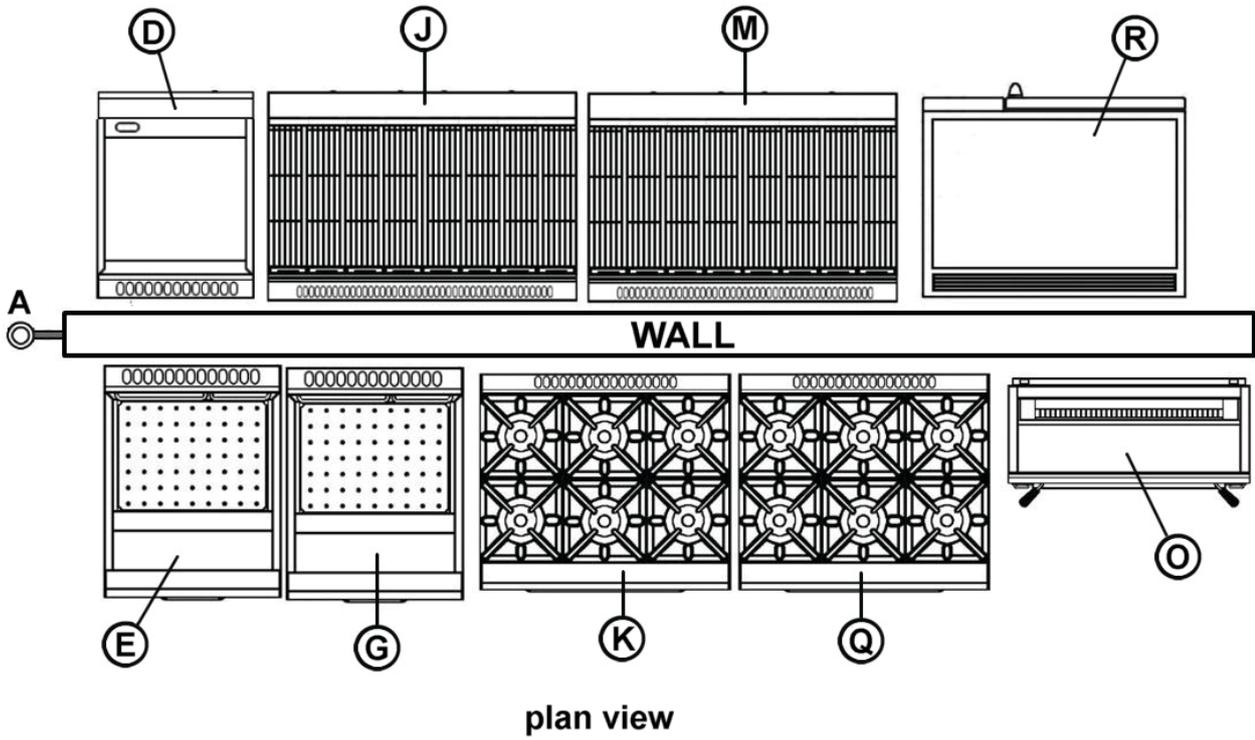
Freestanding appliances only will require flexible hoses.

Referring to the Appliance Information sheet supplied, complete the following tables for this installation so that it meets the minimum requirements of NZS 5261 Gas Installation.

Pipe Section	MJ	Diameter	Pipe Section	MJ	Diameter
A - B			I - K		
B - C			H - L		
C - D			L - M		
C - E			L - N		
B - F			N - O		
F - G			N - P		
F - H			P - R		
H - I			P - Q		
I - J					

Supply Pressure	
Length of Longest Run	
Design Pressure Drop	
Installation Pressure Drop/m	
Quantity of 15 mm Appliance Regulators	
Quantity of 20 mm Appliance Regulators	
Quantity of 15 mm Flexible Hoses	
Quantity of 20 mm Flexible Hoses	

Total 23 marks



QUESTION 6

A pipe is to be installed to feed a natural gas water heater with a consumption of 240 MJ/h. The supply pressure is 2.5 kPa and the distance from the supply point to the appliance is 25 m.

Determine the minimum size of the pipe required according to NZS 5261 Gas Installation in each of the following situations.

(a) If steel pipe is used.

(2 marks)

(b) If copper pipe is used.

(2 marks)

Total 4 marks

QUESTION 7

An appliance has vent lines with the diameters 25 mm, 20 mm and 15 mm. The vent lines are to be joined to a common vent line.

Using NZS 5261 Gas Installation, determine the minimum diameter of the common vent line required.

Total 5 marks

QUESTION 8

Answer the following questions in accordance with NZS 5428.

- (a) State the specific installation requirement that must be met when a gas hob is to be installed directly above a gas refrigerator, and give the reason for this requirement.

(2 marks)

- (b) A boat has an LPG cooker. It is impractical to use the boat without covering the permanent ventilation required for the cooker.

Give the TWO options that must be considered for the installation to comply.

1

2

(2 marks)

- (c) State the difference between the ventilation requirements of a pop-up type recreational vehicle and a fully collapsible type.

(1 mark)

QUESTION 8 (cont'd)

(d) List FOUR restrictions on gas hose assemblies.

- 1 _____
- 2 _____
- 3 _____
- 4 _____

(2 marks)

(e) A drain is to be installed for an LPG cooker on a boat.

Give FOUR requirements that the drain must meet.

- 1 _____
- 2 _____
- 3 _____
- 4 _____

(2 marks)

Total 9 marks

QUESTION 9

(a) A caravan is designed to house five occupants.

The appliances installed in the caravan are a cooker with a gas consumption of 41,000 BTU, and a heater with a gas consumption of 68,000 BTU.

(i) Calculate the minimum free area of the permanent ventilation required.

(3 marks)

(ii) The ventilation opening calculated above is to be 240 mm wide.

Calculate the height of the opening.

(1 mark)

QUESTION 9 (cont'd)

(b) According to NZS 5428, a 90 litre gas refrigerator installed in a caravan has ventilation requirements that are specific to refrigerators.

(i) Give TWO conditions regarding the ventilation that must be met.

- 1 _____
- 2 _____

(1 mark)

(ii) Give the minimum free area of the ventilation required for this situation.

(1 mark)

(iii) Give TWO reasons for these specific requirements.

- 1 _____
- 2 _____

(2 marks)

Total 8 marks

SECTION B

Answer the following multiple-choice questions by writing your answer (A, B, C, D or E) in the box provided after each one of the questions.

Each correct answer in this section of the examination is worth 1 mark.

Note that should your choice of answer be unclear in this section of the examination no marks will be awarded for that question.

1. Which material is best suited for a flue which is subject to very high temperatures, according to NZS 5261?

- A 1.6 mm mild steel.
- B Fire bricks, set in fire clay.
- C 0.5 mm copper.
- D 430 grade stainless steel.
- E Heavy grade fibre cement.

2. What is the minimum length permitted for a flexible hose between a cylinder and the regulator it supplies?

- A 200 mm
- B 300 mm
- C 400 mm
- D 500 mm
- E 600 mm

3. Which statement specifies the load that cylinder restraints must be designed to withstand?

- A Twice the weight of the cylinder.
- B Three times the weight of the cylinder.
- C Four times the weight of the cylinder.
- D Six times the weight of the cylinder.
- E Ten times the weight of the cylinder.

4. According to NZS 5428, what is the maximum capacity of gas an LPG locker with internal access on a boat is permitted to contain?
- A One 9 kg cylinder.
 - B Two 9 kg cylinders.
 - C One 15 kg cylinder.
 - D Two 15 kg cylinders.
 - E One 18 kg cylinder.

5. According to NZS 5428, the bottom edge of an LPG locker door with internal access on a boat must be at least how far above the locker floor?
- A 15 mm
 - B 19 mm
 - C 25 mm
 - D 30 mm
 - E 50 mm

6. According to NZS 5261, an OPSO (over pressure shut off) valve requires a filter that will prevent particles larger than 1 mm from entering the device.

Within what distance of the valve must the filter be?

- A 0.3 m
- B 0.6 m
- C 1 m
- D 2 m
- E 5 m

7. According to NZS 5428, what is the minimum possible permitted free area of the total permanent ventilation in a caravan?

A 1000 mm²

B 2000 mm²

C 3000 mm²

D 4000 mm²

E 5000 mm²

8. When taking a flue gas analysis of a natural gas burner, what percentage of carbon dioxide is closest to perfect combustion?

A 10%

B 12%

C 16%

D 18%

E 20%

9. According to NZS 5261, what is the minimum clearance below a ceiling that an indoor flueless continuous flow water heater must have?

A 0.5 m

B 0.6 m

C 0.8 m

D 1.0 m

E 1.2 m

10. According to NZS 5261, a manual reset high temperature device is required on a gas fired pool heater to prevent the water exceeding what temperature?

- A 30°C
- B 35°C
- C 40°C
- D 42°C
- E 45°C

11. A 40 MJ storage water heater with a natural draught flue is to be installed in a cupboard. The cupboard will be ventilated using mechanical means.

According to NZS 5261, what is the minimum volume of air the fan will need to supply at low level?

- A 20 litres/s
- B 40 litres/s
- C 50 litres/s
- D 100 litres/s
- E 150 litres/s

12. What minimum clearance is required between a telephone cable and the flue of a gas-fired storage water heater with a natural draught flue?

- A 50 mm
- B 75 mm
- C 100 mm
- D 150 mm
- E 200 mm

13. What should the minimum height of a natural draught flue be if it is not specified in the appliance manufacturer's instructions?

- A 0.3 m
- B 0.6 m
- C 0.9 m
- D 1.0 m
- E 1.2 m

14. A 9 kg LPG cylinder is permitted to be used indoors with which type of connection?

- A QCC
- B Companion/Camping
- C POL
- D CGA555
- E Primus

15. When a gas appliance is to be installed in a garage, what is the minimum height above the ground that the burners and combustion air intake should be situated?

- A 100 mm
- B 250 mm
- C 300 mm
- D 450 mm
- E 600 mm

16. What is the maximum gas pressure that can be supplied to a Bunsen burner with a push-on connector?

- A 2.5 kPa
- B 3.0 kPa
- C 3.5 kPa
- D 5.0 kPa
- E 7.0 kPa

17. What total input rating must a flueless gas appliance in a passageway not exceed?

- A 100 W/m³
- B 150 W/m³
- C 200 W/m³
- D 250 W/m³
- E 300 W/m³

18. Which of the following specifies the minimum permitted gradient on a lateral run of flue?

- A 10 mm per m
- B 12 mm per m
- C 20 mm per m
- D 24 mm per m
- E 28 mm per m

19. A 30 MJ internal gas storage water heater is to be installed in a room using only adventitious ventilation.

What is the minimum volume the room can have?

- A 10 m³
- B 12 m³
- C 18 m³
- D 24 m³
- E 30 m³

20. A twin wall flue is to be installed inside a wall of a house.

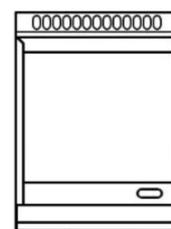
What is the maximum input that an appliance connected to the flue can have?

- A 34 MJ
- B 40 MJ
- C 45 MJ
- D 50 MJ
- E 60 MJ

Total 20 marks

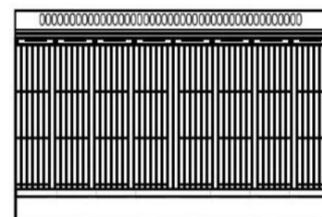
APPLIANCE INFORMATION SHEET

Bench Griddle	Natural	L.P.G.
Bench top	BG453N	BG453P
Gas Consumption	60mj	62mj
Gas Inlet Pipe Size	15mm	15mm
Operating Pressure	1.2kpa	2.75kpa



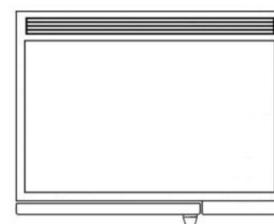
Bench Griddle

Chargrill	Natural	L.P.G.
Bench top	CH98765N	CH98765P
Gas Consumption	128mj	136mj
Gas Inlet Pipe Size	20mm	20mm
Operating Pressure	1.5kpa	2.75kpa



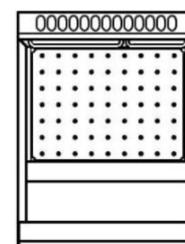
Chargrill

Combi-Steamer	Natural	L.P.G.
Free Standing	CSL55543N	CSL55543P
Gas Consumption	96mj	98mj
Gas Inlet Pipe Size	15mm	15mm
Operating Pressure	1.5kpa	2.75kpa



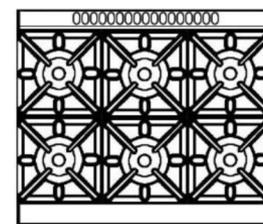
Combi-Steamer

Deep Fryer	Natural	L.P.G.
Free Standing	DFA33453N	DFA33453P
Gas Consumption	150mj	160mj
Gas Inlet Pipe Size	20mm	20mm
Operating Pressure	2.0kpa	2.75kpa



Deep Fryer

Oven	Natural	L.P.G.
Free Standing	BG453N	BG453P
Gas Consumption	196mj	204mj
Gas Inlet Pipe Size	20mm	20mm
Operating Pressure	1.0kpa	2.75kpa



Oven

Salamander	Natural	L.P.G.
Bench top	DFRE345N	DFRE345P
Gas Consumption	31.5mj	34mj
Gas Inlet Pipe Size	15mm	15mm
Operating Pressure	2.5kpa	2.75kpa



Salamander

For Examiner's use only

Question number	Marks	Marks
1		
2		
3		
4		
5		
6		
7		
8		
9		
Section B		
Total		