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

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No. 9196

Plumbers, Gasfitters and Drainlayers Board

CRAFTSMAN EXAMINATION, NOVEMBER 2007

GASFITTING

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, ask the Supervisor for extra sheets. Write your Candidate Code Number and the number 9196 on any extra sheets used, and attach them to this booklet. NO SEPARATE ANSWER BOOKLET IS TO BE USED. Write the number of extra sheets used in the box on the last page of this booklet. Write NIL if you have not used any.

All working in calculations must be shown.

Candidates are permitted to use the following in this examination:

Drawing instruments, approved calculators

The following are NOT permitted in the examination room:

Any publications, Acts, Regulations, Codes of Practice, or Standards

Check that this booklet has all of 19 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

QUESTION 1

(a) List the TWO purposes of NZS 5261 (the Gas Installation Standard).

1. _____

_____

2 _____

_____

(2 marks) ☐

(b) The gas installation code NZS 5261 Part 1 lists the performance criteria to be achieved by installers. List TWO code references that give acceptable means of compliance with these requirements.

1 _____

2 _____

(2 marks) ☐

(c) List TWO types of gasfitting excluded from the requirements of NZS 5261.

1 _____

2 _____

(2 marks) ☐

(d) State THREE safety requirements specified in the Building Code that must be considered when a gas-piping system for installation in a building is being designed.

1 _____

2 _____

3 _____

(3 marks) ☐

Total 9 marks ☐

QUESTION 2

(a) State TEN factors that should be considered when selecting the position for an instantaneous gas fired water heater that is to be installed externally to a building.

1 _____

2 _____

3 _____

4 _____

5 _____

6 _____

7 _____

8 _____

9 _____

10 _____

(5 marks) ☐

(b) Identify FOUR safety instructions that must be given to a consumer after commissioning the installation of an external gas fired instantaneous water heater.

1 _____

2 _____

3 _____

4 _____

(4 marks) ☐

(c) State TWO clearances that are required when a small single point, gas fired, flueless instantaneous water heater is being installed in a kitchen.

1 _____

2 _____

(2 marks) ☐

Total 11 marks ☐

QUESTION 3

(a) A contract at a rest home complex requires the removal of an old coal fired boiler and replacement with a natural gas boiler. The boiler is to provide low pressure hot water heating via the existing hot water radiators in each block. 90kW is required for the central heating in each of the four blocks connected to the central boiler house.

If the efficiency of the new boiler is 83%, calculate the minimum input of the boiler required.

1kW = 3.6MJ/hr

(2 marks)

QUESTION 3 (cont'd)

(b) The diagram on the opposite page shows a site plan of the rest home complex.

In addition to supplying gas to the new boiler, a 250MJ water heater is to be installed in each of the four blocks.

The gas pressure at the meter is 2kPa.

Referring to the diagram and the following graph (Figure E3) complete the table below to size the steel gas pipe work for the installation.

Pipe section	Length (m)	Gas flow (MJ/h)	Pipe size (mm)
A – B			
B – C			
B – D			
D – E			
E – F			
E – G			
G – H			

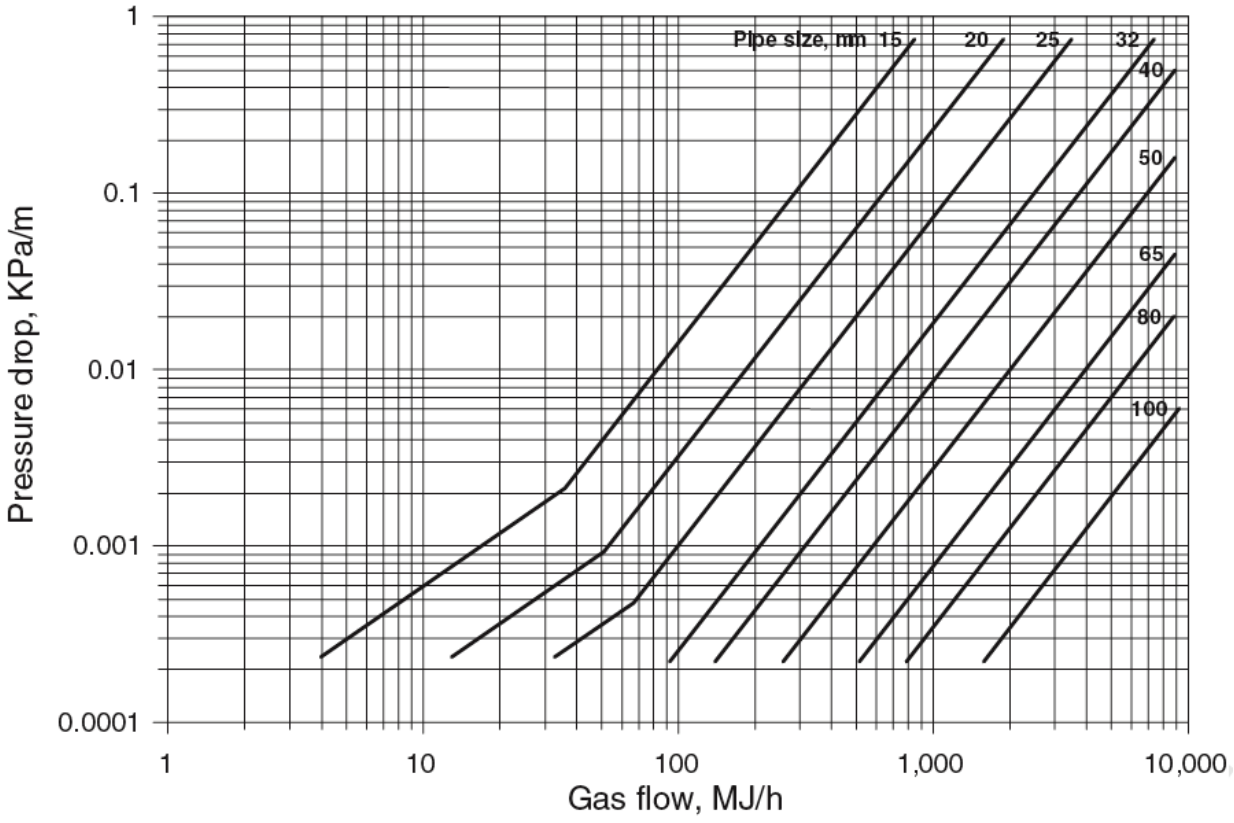
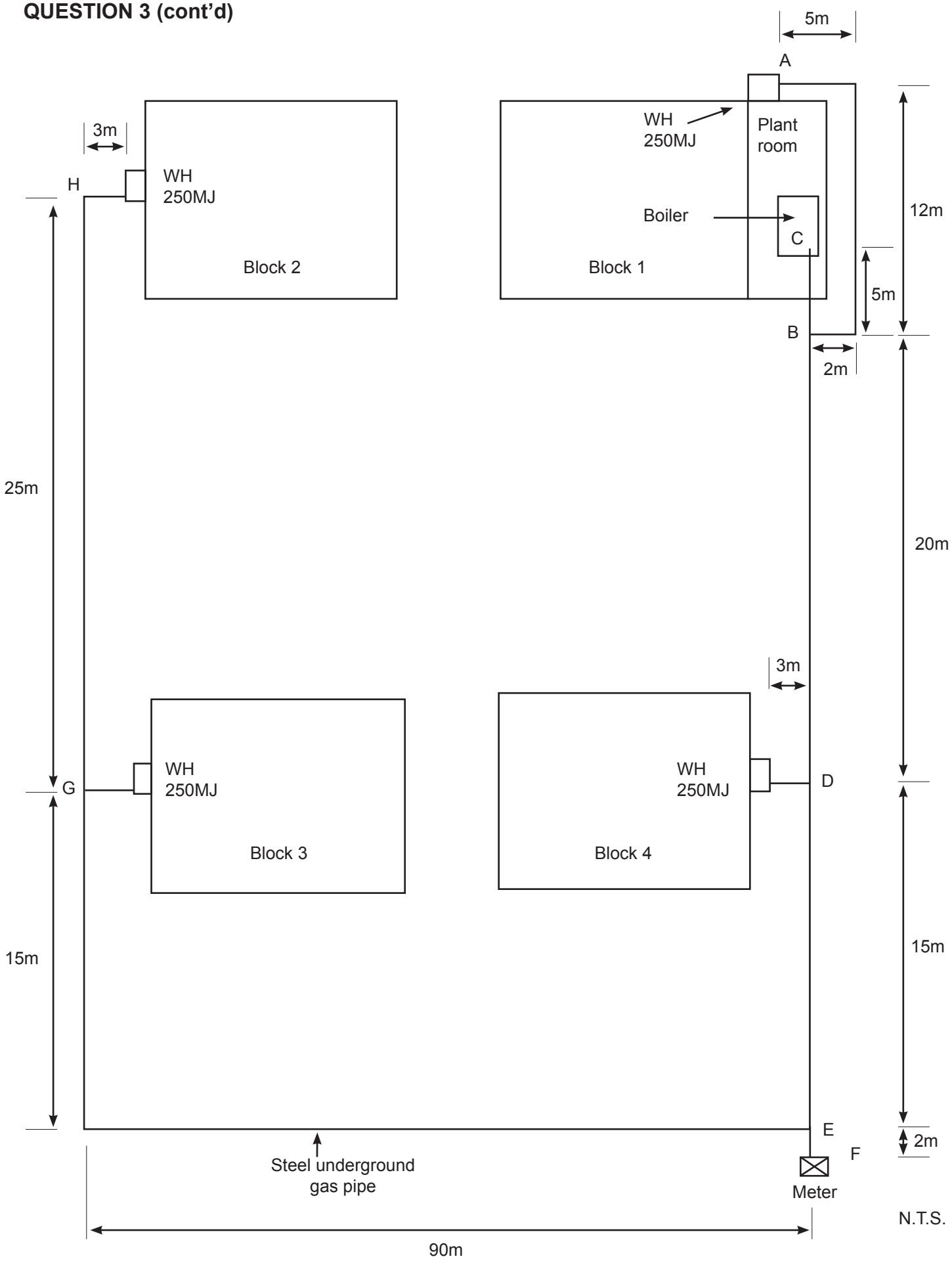


Figure E3 – Pipe sizing for natural gas in steel pipe

(9 marks)

Total 11 marks

QUESTION 3 (cont'd)



QUESTION 4

An installation requires 45kg Liquefied Petroleum Gas (LPG) cylinders. Each cylinder delivers 52MJ/hr. The installation will operate at a maximum capacity of 80%.

Each of the following appliances is installed with the input rating as shown.

1 cooker	15kW
1 fire	12kW
1 space heater	18MJ/hr
1 water heater	58kW
1 clothes dryer	28MJ/hr

1 kW = 3.6MJ

(a) Calculate the number of cylinders required.

(4 marks)

(b) State the minimum number of cylinders that should be in reserve if in situ refilling is not available.

(1 mark)

QUESTION 4 (cont'd)

(c) State FIVE factors that need to be specified when selecting a regulator for a gas installation.

1 _____

2 _____

3 _____

4 _____

5 _____

(5 marks) ☐

Total 10 marks ☐

QUESTION 5

(a) A passageway is 6.3m long, 1.2m wide and 2.4m high. The maximum input of a flueless heater for this space cannot exceed 0.4MJ/hr per cubic metre of room volume.

Calculate the maximum input rating in kW for the heater.

(2 marks)

(b) State the TWO conditions that govern the installation of a gas heater in a bathroom.

1

2

(2 marks)

(c) State FIVE compliance checks that should be carried out when certifying an installation containing an upright gas cooker fitted with a flexible hose.

1

2

3

4

5

(5 marks)

QUESTION 5 (cont'd)

(d) (i) A sitting room measures 5.0m by 7.5m, and has a stud height of 3.0m. The room is to have a gas fired space heater installed.

The heat-input requirement for the room is 0.36MJ/m^3 and the appliance efficiency is 70%.

Calculate the input rating for the heater.

(ii) Calculate the gas rate in cubic metres per hour required for the space heater in (i).

The heating value for the gas is 42MJ/h.

(4 marks)

Total 13 marks

QUESTION 6

Calculate the corrected meter volume from the following. Show all working.

Meter gauge pressure = 20kPa
Atmospheric pressure = 101.3kPa
Measured volume shown on meter = 3000m^3

Formula: P1 x V1 = P2 x V2

Total 4 marks

QUESTION 7

(a) A gas space heater is to be installed in an existing fireplace that has a brick chimney.

Specify FIVE checks that must be made before the heater is installed.

1 _____

2 _____

3 _____

4 _____

5 _____

(5 marks)

(b) A gas flame is long, fierce and causing overheating. State TWO probable causes of this.

1 _____

2 _____

(1 mark)

Total 6 marks

QUESTION 8

NZS 5261 requires that where a gas appliance having a total input of over 3MJ/hr per m^3 (of room volume) is installed in a room or enclosure, that room or enclosure must be ventilated.

A meeting room measures 7.6m long by 5.6m wide by 2.7m high. The total input rating of a gas appliance in the room is 392MJ/hr.

(a) Show that ventilation will be required. Show all workings.

(2 marks)

(b) In (a) ventilation is to be directly to outside. Referring to the table below, calculate the free area necessary.

Formula: A = F x T

where A = the free ventilation area in mm
F = the factor given in the table
T = the total gas consumption of the appliance

Gas appliance location	Source of ventilation	Factor F
Gas appliance in a room or enclosure, other than a plant room	Directly to outside	300
	Via an adjacent room	600
Gas appliance in a plant room	Directly to outside	150
	Via an adjacent room	300

(1 mark)

QUESTION 8 (cont'd)

(c) State where ventilation openings should be positioned and what the area of each should be.

Position: _____

Area of each: _____

(2 marks)

Total 5 marks

QUESTION 9

(a) For each of the following burner types, state the conditions that apply to the gas and combustible air supply.

(i) Natural draught radiant burner

(ii) Forced draught nozzle mix burner

(iii) Air blast burner

(3 marks)

(b) For each of the following burner types, state where the gas/air mixing occurs.

(i) Natural draught radiant burner

(ii) Forced draught nozzle mix burner

(iii) Air blast burner

(3 marks)

QUESTION 9 (cont'd)

(c) Give THREE possible reasons why a package burner may shut down and go to lock out.

1 _____

2 _____

3 _____

(3 marks)

Total 9 marks

QUESTION 10

(a) A conventional flue for a gas appliance is being designed.

State FOUR ways that condensation can be minimised when designing a conventional flue for a gas appliance.

1 _____

2 _____

3 _____

4 _____

(4 marks)

(b) Flueless space heaters can cause condensation. Explain how production of condensation can be reduced.

_____

_____

_____

(1 mark)

(c) Briefly describe TWO methods of protecting a timber structure that has a gas appliance flue passing through it.

1 _____

_____

2 _____

_____

(2 marks)

(d) State TWO factors that contribute most to the reduction of heat loss from a flue.

1 _____

2 _____

(1 mark)

QUESTION 10 (cont'd)

(e) A natural draught flue has laterals and bends.

State TWO design options that can be used to reduce flow restrictions.

1 _____

2 _____

(2 marks)

(f) State typical requirements for

(i) the percentage of excess air in a natural draught flue

_____

(ii) the percentage of dilution air at the draught diverter in a natural draught flue.

_____

(2 marks)

Total 12 marks

QUESTION 11

(a) State the circumstances under which gas appliance vent lines can be interconnected.

(1 mark)

(b) A common vent line must have a minimum cross sectional area equal to the sum of the cross sectional areas of the two largest vent lines being interconnected.

The following vents are run from an appliance:

1 at 50mm
2 at 40mm
1 at 15mm

Calculate the minimum pipe diameter required for the common vent line.

(4 marks)

Total 5 marks

QUESTION 12

A gas installation to use propane from four 45kg conventional storage cylinders is being designed.

Identify TEN conditions that must be complied with in relation to the location and protection of the cylinders.

1 _____

2 _____

3 _____

4 _____

5 _____

6 _____

7 _____

8 _____

9 _____

10 _____

Total 5 marks

For Candidate's use

Number of EXTRA sheets used (write NIL if none have been used).	

For Examiner's use only

Questions Answered	Marks	Marks
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
Total		