

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

## REGISTRATION EXAMINATION, JUNE 2015

# 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 16–17 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 17 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 June 2015 were provided with the following documents:

- NZS 5255 Safety verification of existing installations
- AS/NZS 5601.2013 Part 1: General installations
- AS/NZS 5601.2013 Part 2: LP Gas installations in caravans and boats for non-propulsive purposes

## USEFUL FORMULAE

Circumference of circle =  $2 \times \pi \times R$  or Circumference of circle =  $\pi \times D$

Area of circle =  $\pi \times R^2$  or Area of circle =  $0.7854 \times D^2$

Volume of cylinder =  $\pi \times R^2 \times H$  or Volume of cylinder =  $0.7854 \times D^2 \times H$

Heating time =  $\frac{\text{mass of water (kg)} \times 4.2 \times \text{temp diff (}^\circ\text{C)} \times 100}{\text{heat energy input per hour in kJ} \times \text{efficiency (\%)}}$

Correction factor =  $\frac{\text{atmospheric pressure} + \text{supply pressure}}{\text{atmospheric pressure}}$

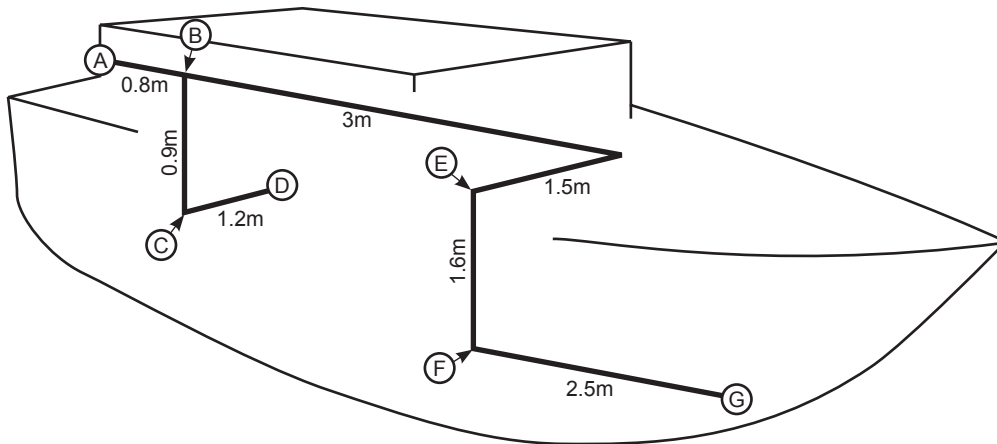
Gas rate (m<sup>3</sup>/h) =  $\frac{\text{volume (m}^3\text{)} \times 3600}{\text{time (seconds)}}$

# SECTION A

## QUESTION 1

(a) The diagram below shows a schematic of rigid pipework to be installed in a boat.

- Support is to be provided 150 mm from each end of the pipe.
- Three supports are to be included for each tee, each located 150 mm from the tee.
- Two supports are to be included for each bend, each located 150 mm from the bend.



Complete the following table to show the number of supports required for the pipework. The supports are to be installed to comply with the minimum requirements of AS/NZS 5601 Part 2.

Pipe Section	Number of supports
A - B	
B - C	
C - D	
B - E	
E - F	
F - G	

(6 marks)

(b) State TWO requirements that must be met when selecting pipe supports as specified in AS/NZS 5601 Part 2.

1 \_\_\_\_\_

2 \_\_\_\_\_

(2 marks)

**Total 8 marks**

## QUESTION 2

The diagram on the opposite page shows a plan of the pipework and appliances for a gas installation in a commercial laundry.

Installation details are as follows:

- LPG
- Copper pipe (NZS 3501)
- The installation supply pressure is 2.9 kPa.

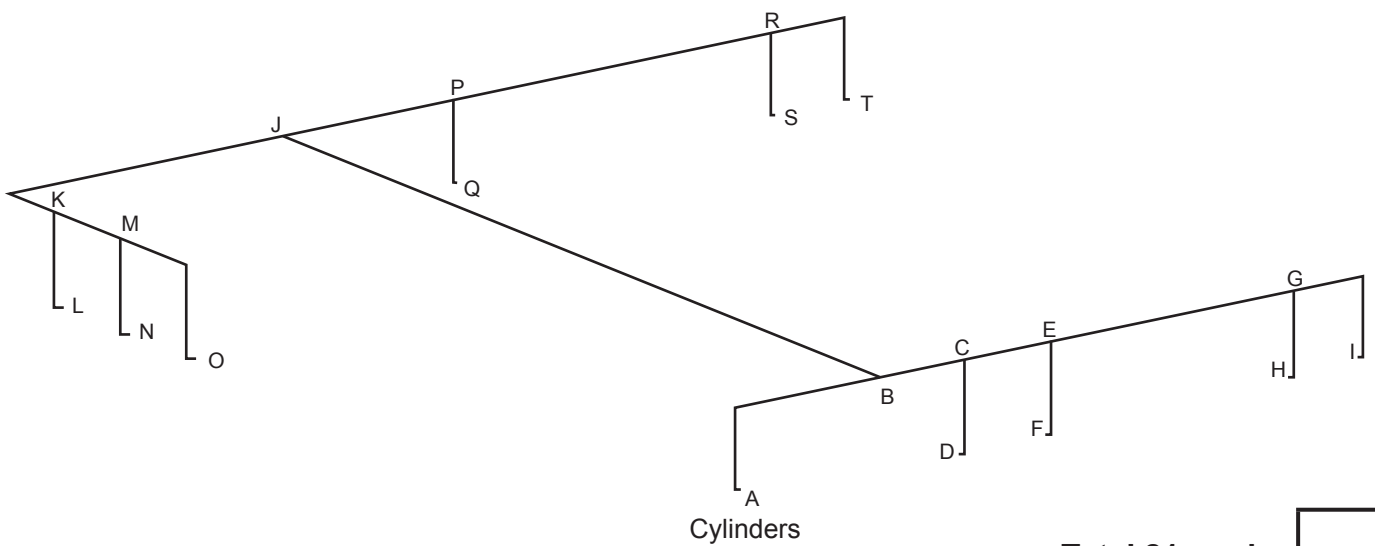
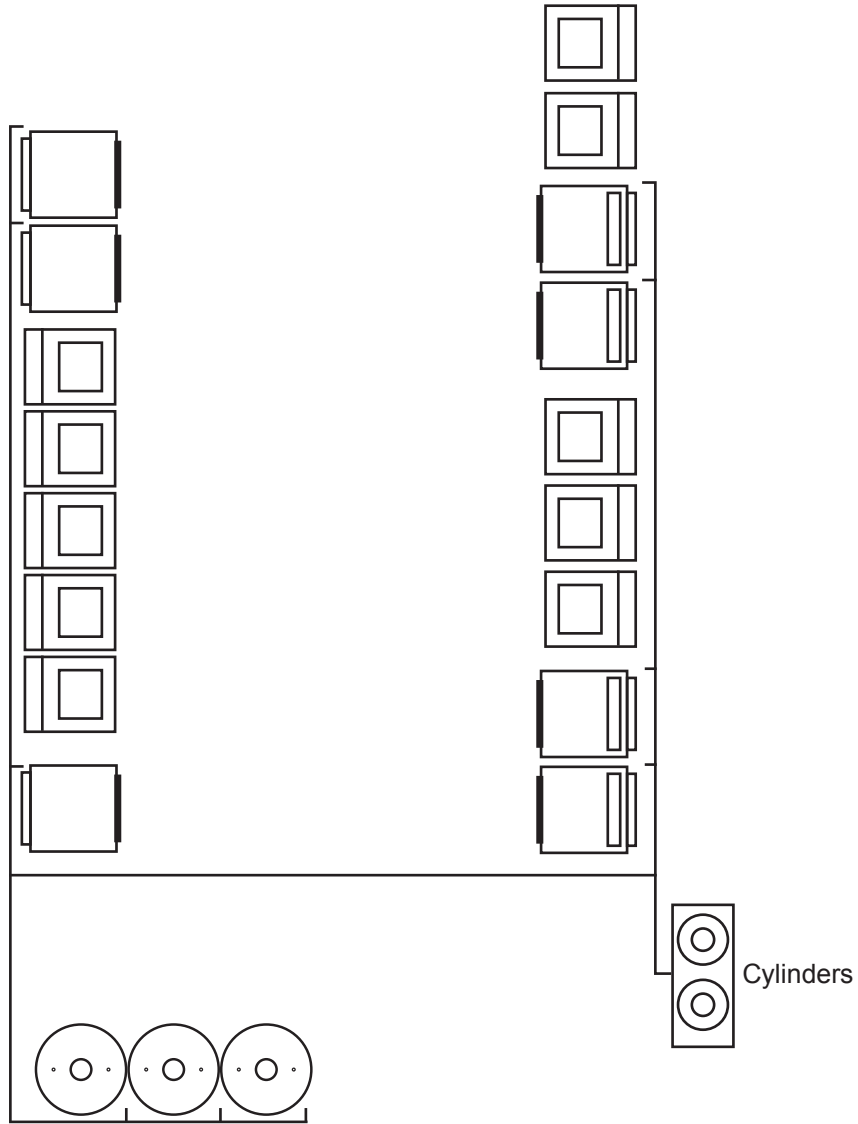
		
Gas Clothes Dryer 360 MJ/h	Gas Clothes Dryer 220 MJ/h	Gas Water Heater 45 MJ/h

Using the Pipe Sizing Tables from AS/NZS 5601 Part 1, complete the tables below to pipe size the installation.

Main run	
Allowable pressure drop	

Pipe section	Length (m)	Main run m (from above)	Gas flow MJ/h	Nominal size
A - B	3.5			
B - C	1.5			
C - D	1.8			
C - E	1			
E - F	1.8			
E - G	4			
G - H	1.8			
G - I	3			
B - J	5.7			
J - K	4			
K - L	2			
K - M	1			
M - N	2			
M - O	3			
J - P	1.5			
P - Q	1.7			
P - R	5			
R - S	1.7			
R - T	2.7			

**QUESTION 2 (cont'd)**



**Total 21 marks**

### QUESTION 3

The commercial laundry gas installation shown in question 2 is fuelled by LPG. The average lowest temperature at this location is  $-1^{\circ}\text{C}$ .

- (a) Using AS/NZS 5601 Part 1 as a guide, calculate the number of 90 kg LPG exchange cylinders needed to supply an adequate gas supply when all appliances are operating at once.

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(2 marks)

- (b) State how many cylinders should be kept in reserve for use when the primary cylinders have been emptied.

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(1 mark)

- (c) State when a location test certificate is required for an LPG installation.

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(2 marks)

**Total 5 marks**

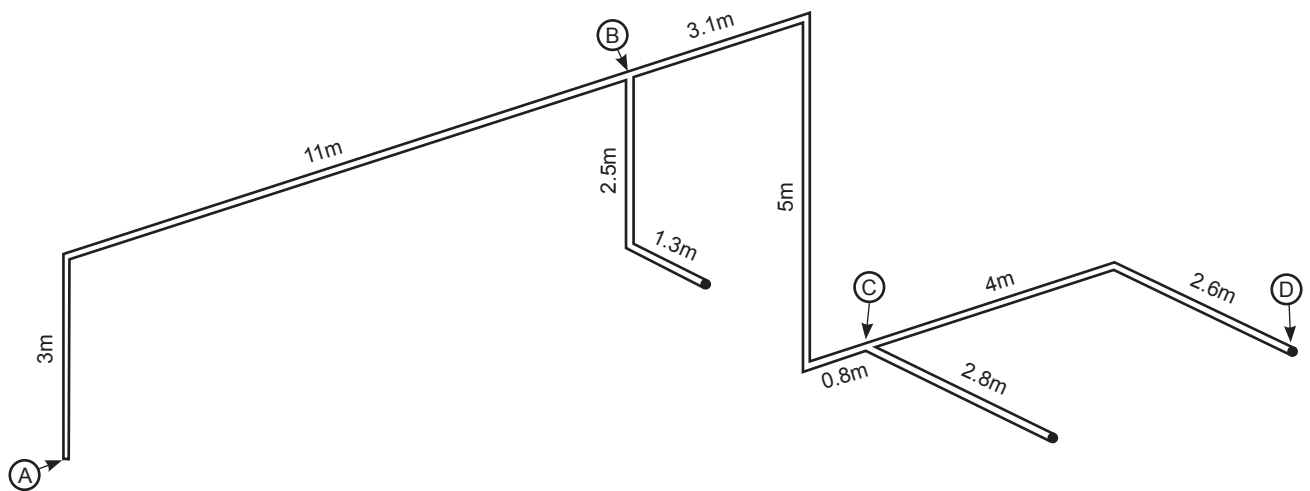
#### QUESTION 4

- (a) The diagram below shows a schematic of existing gas copper pipework (NZS 3501) in a building.

Pipe diameters are as follows:

- A – B 32 mm
- B – C 25 mm
- C – D 20 mm
- All other sections 15 mm.

Calculate the capacity of the pipework.



(5 marks)

- (b) State the maximum acceptable pressure drop permitted, as specified in AS/NZS 5601 Part 1 when a leakage test is being undertaken on the installation in (a).

(1 mark)

**Total 6 marks**



### QUESTION 5

A gas burner has been operated on full and 14.65 m<sup>3</sup>/h of natural gas was being consumed.

The installation supply pressure is 9 kPa.

(a) Calculate the corrected gas consumption in MJ/h.

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(4 marks)

(b) The burner is 76% efficient.

Calculate the output of the burner in MJ/h.

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(1 mark)

(c) Calculate how much oxygen will be consumed by the burner every hour.

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(2 marks)

**Total 7 marks**

## QUESTION 6

Give the meaning of the following terms in relation to the New Zealand Building Code.

(a) Acceptable solution

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(2 marks)

(b) Verification method

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(2 marks)

(c) Alternative solution

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(2 marks)

(d) Compliance documents

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(2 marks)

**Total 8 marks**

## QUESTION 7

Name THREE licensing/authorisation categories for which workers must be supervised and have their work verified by a certifying gasfitter.

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

Total 3 marks

## QUESTION 8

After an addition to an existing gas installation has been completed a Certificate of Compliance (COC) is required to be generated by a suitably qualified person.

(a) State a licence class that is required for a gasfitter to be able to complete a COC.

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(1 mark)

(b) List SIX items of information that a COC must contain.

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

4 \_\_\_\_\_

5 \_\_\_\_\_

6 \_\_\_\_\_

(6 marks)

(c) Other than creating a COC, list TWO further documents or forms that must be completed after the work has been finished.

1 \_\_\_\_\_

2 \_\_\_\_\_

(2 marks)

**Total 9 marks**

**QUESTION 9**

- (a) When performing a safety verification of an existing gas installation to NZS 5255 states that the inspection must be supplemented by appropriate tests.

List FOUR tests that this may include.

- 1 \_\_\_\_\_
- 2 \_\_\_\_\_
- 3 \_\_\_\_\_
- 4 \_\_\_\_\_

(2 marks)

- (b) State who is to be provided with a copy of the safety verification results.

\_\_\_\_\_

(1 mark)

- (c) List FOUR evaluation methods that may be used to provide evidence of compliance when undertaking a safety verification of an existing installation.

- 1 \_\_\_\_\_
- 2 \_\_\_\_\_
- 3 \_\_\_\_\_
- 4 \_\_\_\_\_

(2 marks)

**Total 5 marks**

**QUESTION 10**

(a) Complete the table below by indicating which of the situations listed are notifiable work and which ones are not.

	Notifiable work Yes / No
Assembling a scaffold which is over 5 metres high	
Working in a confined space	
Working on a scaffold which is over 5 metres high	
Work in which a person wears a face mask with filter canisters	
Work on the roof of a 2-storey residential building which is 6 metres high	
A trench which is 1.8 metres deep and 1.5 metres wide at the top	

(6 marks)

(b) Give SIX items of information that must be provided to WorkSafe NZ when some work is to be undertaken that is deemed to be notifiable work.

- 1 \_\_\_\_\_
- 2 \_\_\_\_\_
- 3 \_\_\_\_\_
- 4 \_\_\_\_\_
- 5 \_\_\_\_\_
- 6 \_\_\_\_\_

(6 marks)

**Total 12 marks**

## QUESTION 11

A boiler fitted with a package burner operates on natural gas.

(a) State THREE conditions that must be met before an accurate flue gas analysis can take place.

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

(3 marks)

(b) Give THREE flue gas measurements that are needed to calculate the boiler efficiency (flue gas analysis).

1 \_\_\_\_\_

2 \_\_\_\_\_

3 \_\_\_\_\_

(3 marks)

**Total 6 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 no mark will be awarded for that question.

1. Which of the following is NOT required on an appliance data plate?

- A Burner injector sizes.
- B Gas consumption.
- C Gas type.
- D Operating pressure.
- E Supplier name.

2. Which of the following New Zealand Building Code clauses provides an acceptable solution for designing and installing soaker flashings?

- A B2
- B E1
- C E2
- D G1
- E G12

3. Which of the following is not a type of flame failure system?

- A Flame rectification.
- B Mercury vapour valve.
- C Oxygen depletion pilot.
- D Thermoelectric.
- E Ultra violet.



4. Flues can sometimes be joined together, for example to have fewer penetrations through the roof of the building.

Under what circumstances is this NOT permitted?

- A Appliances with atmospheric burners joined to the same flue as appliances with forced draught burners.
- B Appliance that run at different burner operating pressures.
- C Appliances for use with propane gas.
- D Appliances with an hourly consumption in excess of 90 MJ.
- E Appliances for use in school or early childcare facilities.

5. AS/NZS 5601 Part 1 specifies the total input rating that must not be exceeded when a flueless space heater is to be installed in a habitable space.

Which of the following is the maximum total input for a thermostatically controlled flueless space heater installed in a lobby?

- A 4.0 MJ/h/m<sup>3</sup>.
- B 2.0 MJ/h/m<sup>3</sup>.
- C 0.4 MJ/h/m<sup>3</sup>.
- D 0.2 MJ/h/m<sup>3</sup>.
- E 0.02 MJ/h/m<sup>3</sup>.

6. According to AS/NZS 5601 Part 1, what temperature must the combustion products from a natural gas appliance entering a common flue not exceed?

- A 200°C.
- B 300°C.
- C 350°C.
- D 375°C.
- E 440°C.

7. According to AS/NZS 5601 Part 1, what is the minimum clearance between a 200 mm ID single wall flue for a space heater and an unprotected combustible surface?

- A 10 mm.
- B 25 mm.
- C 50 mm.
- D 75 mm.
- E 100 mm.

8. According to AS/NZS 5601 Part 1, what is the minimum clearance permitted between an open flue terminal and another flue terminal?

- A 200 mm.
- B 300 mm.
- C 500 mm.
- D 600 mm.
- E 1000 mm.

9. According to AS/NZS 5601 Part 1, a manometer (water gauge) is only suitable for testing up to what pressure?

- A 3 kPa.
- B 5 kPa.
- C 7 kPa.
- D 10 kPa.
- E 30 kPa.

10. What two parties should be notified in the event that an unsafe gas installation is found?

- A The gas supplier and the owner/occupier.
- B The owner/occupier and the Plumbers, Gasfitters and Drainlayers Board.
- C The local territorial authority and the owner/occupier.
- D The owner/occupier and Energy Safety.
- E The Plumbers, Gasfitters and Drainlayers Board and Energy Safety.

**Total 10 marks**

For Examiner's use only

Question number	Marks	Marks
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
Section B		
Total		