No. 9196

Plumbers, Gasfitters and Drainlayers Board

CRAFTSMAN EXAMINATION, JUNE 2009

GASFITTING

ANSWER SCHEDULE

ANSWER 1

(a) To record who is responsible for installation (includes when)

To record work carried out at the property (includes notification to supplier)

To record appliances installed

To confirm compliance with Standard

To verify that the installation has been tested

To provide an audit trail

To provide protection for certifier

(Any 4, ½ mark each), (2 marks)

(b) 7 years or until no longer involved in gasfitting

(1 mark)

(c) Gas type suitable and safe for appliances and fittings

Gas supply pressure suitable and safe for appliances and fittings

Adequate volumes to meet anticipated loads

Position of meter or LPG bottles

Maximum supply fault pressure

(3 marks)

(d) (i) For large numbers - Check the ES website to confirm that the appliance has been declared as safe by the Supplier

(2 marks)

(ii) For less than 11 - Obtain from the supplier a declaration to confirm that the appliance has been declared as safe

OR

The craftsman gasfitter can assess and demonstrate compliance in accordance to NZS 5262

(2 marks)

Total 10 marks

ANSWER 2

Mass of water = 240 litres = 240 kg Temperature rise = 70 - 15 = 55ºC (½ mark)

Heat required = mass x Sp Ht x temp rise = 240 × 4.2 × 55 = 55,440 kJ (½ mark)

Heat input = 55,440 x100/75 = 73,920 kJ = 73.92 MJ (1 mark)

Heat up time = 73.92/130 = 0.5686 h = 34.1 minutes (1 mark)

Total 3 marks

ANSWER 3

ANY 12 of the following, ½ mark each

Check pipesizing.

Disconnect pipe work from LPG supply

Pressure test installation for gas tightness and confirm tightness

Change burner injectors to ones suitable for natural gas

Turn on natural gas and purge installation

Adjust/Modify appliance regulator to suit NG requirements

Check gas rate at meter and compare with manufacturer's rating

Check and adjust primary aeration

Inspect flame and complete adjustments

Check function of flame failure device

Check operation of water thermostat

Check ventilation

Check flue pull.

Check for materials stored in cupboard

Ensure data plate indicates NG operation

Recertify the installation

Total 6 marks

ANSWER 4

(a) Pipe material - PE or steel

Protection - bedded in sand
If steel – wrapped and cathodic protection provided

Depth - 450 mm cover

Backfilling - Trench compacted in layers

Marking - Warning tape at 150 to 300 mm above pipe

Risers - External to the building and made of steel or sleeved PE

(1 mark each), (6 marks)

(b) (i) The same size as the vent outlet connection on the regulator

(ii) One pipe size larger than the vent outlet connection on the regulator.

(2 marks)

(c) By installing a flexible (hose) connection.

By installing loops (helixes) in the connecting pipe work.

(2 marks)

(d) Clear of physical damage

Clipped and supported

Clear of other services

Marked as a gas line

Provision for expansion

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

(e) Maximum gas flow rate through meter

Minimum gas flow rate

Gas pressure at meter

Size of pipe connections

Flanged or screwed connections

Type of meter (Any 4, ½ mark each), (2 marks)

Total 15 marks

ANSWER 5

(a) Complete pressure test,

Connect pipe to meter,

Disconnect pipe at appliance,

Check to see no ignition sources around,

Partially open meter outlet valve,

Displace air through appliance connection,

Test for 100% gas at appliance

Shut off valve on inlet to appliance,

Fully open meter outlet valve,

Check for leaks at each end at working pressure,

Complete documentation.

(½ mark for each up to a total of 4 marks), (2 marks for correct sequence), (6 marks)

(b) The appliance must be room sealed or

Be open flued with a flame safeguard system and the room provided with adequate permanent ventilation irrespective of the heater rating

(½ mark each), (2 marks)

Total 8 marks

ANSWER 6

(a) (i) under a window, at least 200mm from outside wall

(ii) at least 75mm above floor

(iii) as far from the door as possible

(3 marks)

(b) to prevent products of combustion from entering the living areas

(1 mark)

(c) in a living area, out of draughts and away from heat sources (1.5m above floor)

(1 mark)

(d) With the heater running and up to temperature set the air velocity by adjustment at each outlet then readjust outlets to reach a balance on all outlets.

(2 marks)

Total 7 Marks

ANSWER 7

(a) – Positioned in accordance with manufacturers instructions

– 600mm or more vertical clearance from combustibles unless protected

– 600mm absolute minimum vertical clearance even if protected

– 200mm horizontal clearance from all burners at burner level or above

– Combustible material closer than 200mm at least 10 mm below burner

(Any 4, ½ mark each), (2 marks)

(b) – Positioned and flued in accordance with manufacturers instructions

– Mounted clear of combustible material

– Clear access to the front

– Recess of suitable size

– Base able to support full weight

– Fixing to retain in position.

– Electric control switch readily accessible

– Sufficient ventilation

(Any 6, ½ mark each), (3 marks)

(c) – Pressure test new pipework to oven

– Connect to existing pipework and retest whole installation

– Connect pipework to appliance and purge through

– Check all clearances around appliance

– Turn on and check power supply to appliance

– Ignite oven burners and check flame patterns

– Check gas rate and adjust if necessary

– Adjust operation if necessary for good combustion

– Check position and operation of flame failure device

– Check on dispersal of products of combustion

– Check oven door seals

– Check position and operation of thermostat

– Check for external overheating

– Explain safe operation to consumer

– Provide consumer with operating instruction book

– Correctly complete Certification certificate

– Provide certificates to PG&D Board, gas supplier and consumer.

– Check operating pressure

(Any 12, ½ mark each), (6 marks)

Total 11 Marks

ANSWER 8

(a) Site must be:–

Well ventilated,

Readily accessible,

Clear of all emergency exits,

Protected from damage by vehicles or stored material,

Clear of electrical equipment,

Protected from excessive temperatures,

Protected from interference.

(Any 6, ½ a mark each), (3 marks)

(b) (i) Regulator set to incorrect pressures,

Regulator seat dirty, or damaged,

Regulator diaphragm split or damaged.

(Any 2 – 1 mark each), (2 marks)

(ii) Pipework too small,

Regulator too small,

Regulator not opening fully,

Blockage in supply line or filter,

Regulator pressure set too low.

(Any 2 – 1 mark each), (2 marks)

(c) (i) Joint must be welded or brazed, and tested, proved sound and inspected prior to being concealed.

(2 marks)

(ii) Duct must be ventilated by having openings top and bottom,

Pipe must be able to be identified.

(2 marks)

Total 11 Marks

ANSWER 9

(a) Check:

Gas shut off if fan fails,

Fan sequence is correct

Air from outside atmosphere supplied at low level,

Air supplied at acceptable volume to gas input rate,

Vent to atmosphere at high level,

(Any 3), (3 marks)

(b) Either above or at the side of the doorway.

(1 mark)

Total 4 Marks

ANSWER 10

(a) Type of gas to be used

Type of pipe material

Input rating of all appliances

Allowance for future developments

Diversity of use

Layout – lengths and fittings

Available pressure to site

Pressures required at appliance inlets

Allowable pressure drop

(Any 6, ½ mark each), (3 marks)

(b) Sketch the layout, and calculate the flow in each section of pipework

Identify the main pipe run and using the allowable pressure drop, size that run

Identify the pressure at the branch points and size the branches again using the allowable pressure drop specified in NZS 5261.

(3 marks)

(c) Cap off or plug all outlets and fit a test piece and gauge

Pressurise the pipework with air to 1.5 times working pressure (7.5 kPa)

Allow a period for stabilisation

Isolate pressure source and measure pressure

Allow at least 5 min for test

Measure pressure at end of test and accept test if no loss.

(½ mark each), (3 marks)

Total 9 Marks

ANSWER 11

(a) EITHER
Photo-Electric
A flame emits ultra violet rays. At a specific wavelength, the photo-electric cell senses this wavelength and converts it to a current which operates the gas valve.

OR
Flame rectification. (flame ionisation)
An a.c. current in the flame probe is conducted and rectified by the flame to produce a small d.c. current. This d.c. current holds the gas valve in the open position until the flame is extinguished.

(3 marks)

(b) They are instantaneous in their reaction to flame extinction,

Their position in relation to the flame is more flexible,

They do not respond to visible rays emitted by the combustion chamber.

(Any 2), (2 marks)

Total 5 Marks

ANSWER 12

(a) – measure of flue gas temperature

– measure of carbon dioxide CO_2

– measure of oxygen O_2

(1 mark each), (3 marks)

(b) 1 mark for value

– 200ºC to 300ºC

– As close as possible to 12%

– Less than 1% (3 marks)

(c) 1 mark for name and 1 mark for reason

Carbon monoxide – If no excess oxygen, combustion may be incomplete and carbon monoxide may be formed.

(2 marks)

(d) Any THREE

– Appliance has reached equilibrium or steady state operation

– Burner is operating at full fire

– Readings are taken in the centre of the flow of products of combustion

– As close as possible to the appliance.

(3 marks)

Total 11 Marks