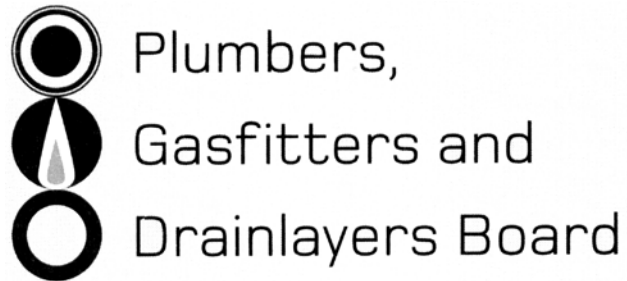


No. 9192



REGISTRATION EXAMINATION, JUNE 2007
PLUMBING

ANSWER SCHEDULE

ANSWER 1

(a) Any FOUR:

- 1 Ensure the face of the excavated trench is cut back and battered to a slope that could be considered adequate enough to prevent the collapse of the trench in all anticipated work and weather conditions.
- 2 Provide adequate shoring appropriate to the ground conditions.
- 3 Provide an approved and appropriate mobile safety cage or box. While this may not prevent the trench collapsing, it will protect the workers inside the cage or box from the collapse.
- 4 Provide adequate steps to the side or end of the trench as appropriate which would reduce the likelihood of a collapse.
- 5 Remove excess ground water.

(½ mark each) (2 marks)

(b) Any TWO:

- 1 Erect a barrier of semi-permanent construction which would be difficult to remove, along with adequate lighting.
- 2 Erect adequate signs to warn of danger and construction site and no entry.
- 3 Cover trench with steel plates to guard against unauthorised entry.
- 4 Install flashing beacons.

(½ mark each) (1 mark)

(c) Any THREE:

- 1 Electricity is provided within the building;
- 2 The pipe conveying the water is metallic;
- 3 Building users are able to make contact with exposed parts of metal water supply pipe or any metallic sanitary fixtures connected to it; and
- 4 The metal pipe is in contact with the ground forming a continuous metallic link from the ground to those parts of the installation exposed to any building users.

(3 marks)

Total 6 marks

ANSWER 2

Any matter of doubt or dispute about whether particular matters comply with the New Zealand Building Code and in particular decisions made by Territorial Authorities or Building Certifiers, may be referred to the Building Industry Authority (Department of Building and Housing) for a determination.

(½ mark each)

Total 2 marks

ANSWER 3

(a) Any SIX:

- 1 Flashback caused by the operator trying to light the torch when there is a mixture of oxygen and fuel gas in the one hose.
- 2 Fires caused by leakage of fuel gas usually from damaged or badly joined sections of hose.
- 3 Explosions or fires caused by welding or cutting pipe tanks or drums without taking appropriate precautions. (i.e. The tank is not an enclosed vessel and/or does not contain any flammable or explosive material even in small quantities.)
- 4 That oily or greasy clothes or clothes that have been used in connection with any flammable material are not worn while gas welding/cutting is being done.
- 5 That adequate precautions are taken to protect the eyes and the body from sparks or burns. (Eye damage.)
- 6 The inhalation of dangerous fumes during operations by the operator or any person in the vicinity.
- 7 That no flammable material is nearby.

(½ mark each) (3 marks)

- (b)
- 1 Wherever possible, cylinders should be transported by trolley and attached to the trolley by clamp or bar chains.
 - 2 All practical steps must be taken to temporarily secure cylinders to a secure point.
 - 3 Cylinders should be transported and stored in an upright position and must never be rolled horizontally along the ground.

(3 marks)

Total 6 marks

ANSWER 4

(a) Any TWO:

- 1 Possibility of air locks in the pipe work.
- 2 Reduced flow of water to an outlet.
- 3 Interrupted flow to an outlet

(1 mark each) (2 marks)

(b) Pressure at the outlet is directly proportional to the head available.

(1 mark)

(c) 1 Head or pressure available

2 The cross-sectional area of the pipe

(2 marks)

Total 5 marks

ANSWER 5

(a) 1 Cause: High velocity flow.

Remedy: Increase the pipe size to reduce the velocity.

2 Cause: Air within the pipe system caused by air leak in the suction line.

Remedy: Repair the pipe to exclude air leak.

(½ mark per cause, ½ mark per remedy) (2 marks)

(b) Any TWO:

Cause: A water logged pressure tank

Any ONE remedy: Completely empty water from pressure tank and recharge with air.
Re-pressurise the pressure vessel.

Cause: Incorrectly set pressure control mechanism.

Remedy: Recalibrate pressure control mechanism to appropriate on/off pressure switching.

Cause: Minor leak on delivery pipe or leaking taps.

Remedy: Check for any leaks and repair.

(4 marks)

- (c) Any TWO:
- 1 By using a float operated ball valve to control the flow.
 - 2 By using a float switch which controls the power to the pump.
 - 3 By using a probe switch which controls the power to the pump.
- (2 marks)
- (d) This is where the pump is installed below the water level of the water that is being pumped.
- (1 mark)
- (e) The foot valve prevents the water in a suction pipe from draining to the level of the water being pumped, and prevents the need for re-priming the pump.
- (1 mark each) (2 marks)
- (f) (i) Reciprocating pump (centrifugal or jet pump acceptable)
- (ii) Centrifugal pump
- (½ mark each) (1 mark)
- Total 12 marks**

ANSWER 6

- (a) Any SIX:
- 1 Location of pipe work
 - 2 Compatibility of the water
 - 3 Its suitability for the pressure that it may be subjected to
 - 4 Resistance to ultra violet rays
 - 5 Ease of installation
 - 6 Durability
 - 7 Electrolysis
 - 8 Noise
- (½ mark each) (3 marks)

(b) Any FOUR:

- 1 Pipe supports need to be able to support the weight of the pipe
- 2 To ensure that the pipe is held in place
- 3 Allow for expansion and contraction.
- 4 Compatible with the pipe to prevent corrosion or possible damage.
- 5 Need to be simple to install.

(½ mark each) (2 marks)

Total 5 marks

ANSWER 7

(a) $V = D^2 \times 0.7854 \times H$

$$H = \frac{V}{D^2 \times 0.7854}$$

(1 mark transposition of formula)

Convert volume to m³ $\frac{270}{1000} = 0.270$

Diameter = 615 - 20 - 20 = 575 mm

$$H = \frac{0.270}{0.575 \times 0.575 \times 0.7854}$$

$$H = \frac{0.270}{0.260}$$

(1 mark working)

= 1.039 metres high (accept 1.040m)

(1 mark correct answer)
(3 marks)

(b) $V = 155 \times 0.075$

$V = 11.625 \text{ m}^3/\text{hr}$

Therefore for 45 minutes $V = 11.625 \times 0.75$

= 8.719 m³

Convert to litres = 8.719 x 1000

= 8719 litres

(1 mark correct working)
(1 mark correct answer)
(2 marks)

(c) Convert volume to m³ $\frac{13.254}{1000} = 0.013254$

$$\text{Diameter}^2 = \frac{V}{0.7854 \times L} \quad (1 \text{ mark transposition of formula})$$

$$= \sqrt{\frac{0.013254}{0.7854 \times 0.750}}$$

$$= \sqrt{\frac{0.013254}{0.58905}} \quad (1 \text{ mark})$$

$$= \sqrt{0.0225}$$

$$= 0.150 \text{ m} \quad (1 \text{ mark answer})$$

Convert to mm $0.150 \times 1000 = 150 \text{ mm diameter}$

(3 marks)

(d)

$$Hp = \sqrt{B^2 + H^2}$$

$$= \sqrt{6.500 \times 6.500 + 1.900 \times 1.900} \quad (1 \text{ mark})$$

$$= \sqrt{42.250 + 3.610} \quad (1 \text{ mark})$$

$$= \sqrt{45.860}$$

$$= 6.772 \text{ metres} \quad (1 \text{ mark answer})$$

(2 marks)

Total 10 marks

ANSWER 8

- (i) A plan is view from above.
- (ii) A cross section is a view of an object at a given point through an object.
- (iii) Isometric projection is a three dimensional 30° angled view of an object.
- (iv) An elevation is a side or end view of an object.

(1 mark each) (4 marks)

Total 4 marks

ANSWER 9

(a) Any SIX:

- (i) Size of room.
- (ii) Number of occupants.
- (iii) Activity of occupants.
- (iv) Type of establishment, i.e., church, theatre, public bar.
- (v) Number and position of doors and windows.
- (vi) Amount of natural air movement.
- (vii) Temperature differential, i.e., inside to outside.
- (viii) Type and degree of air conditioning.
- (ix) Relative humidity.
- (x) Location of dwelling-sun, exposure.

(1 mark each) (6 marks)

(b) Any ONE of:

In the return air duct as close as possible to the furnace.

In the fresh air inlet duct to the furnace.

(1 mark)

- (c) (i) An over-temperature cut-out device.
- (ii) Closes the appliance down.

(1 mark each) (2 marks)

(d) The system becomes more energy efficient (by re-circulating preheated air).

(1 mark)

(e) The grill should be placed as far away as possible from the bedroom door and if possible under a window.

(1 mark)

Total 11 marks

ANSWER 10

(a) Any THREE:

Via a tundish to a floor waste gully trap via a minimum 25 mm diameter pipe which has a maximum length no greater than 10 m.

Via a tundish to a 40 mm diameter waste pipe which is separately trapped.

Via a tundish to a fixtures water trap conditional on it being connected above the water seal of the trap and that the top of the tundish is above the flood level rim of the fixture. The condensate outlet pipe shall have an air gap of at least twice the diameter of the outlet pipe.

Via a tundish and waste pipe to the side channel of a gully trap.

(2 marks each) (6 marks)

(b) Any TWO:

1 All discharge pipes from sinks must terminate to a grease trap

2 All discharge pipes from sinks shall have a minimum diameter of 50 mm.

3 Sinks can not be joined as a fixture pair

(2 marks)

(c) 1 Water Closet (WC) flushing cisterns

2 Flushing valves (meters) supplied from a storage tank

3 Flushing valves(meters) supplied direct from the potable water supply

(3 marks)

Total 11 marks

ANSWER 11

(a) (i) Definition: A floor waste gully is an internal gully trap.

(ii) Purpose: A floor waste gully is use to collect waste in one room and is directly connected by means of a discharge pipe to a drain.

(2 marks)

(b) A water trap shall be located as close as possible to the sanitary fixture it serves.

(1 mark)

(c) Any FOUR:

A single water trap may serve any one of the following outlet combinations located within the same space:

- a) One or two adjacent domestic kitchen sinks together with a dishwashing machine.
- b) One or two adjacent domestic kitchen sinks together with a waste disposal unit.
- c) One or two adjacent laundry tubs together with a clothes washing machine
- d) Two adjacent basins, domestic kitchen sinks or laundry tubs.
- e) One or two adjacent domestic kitchen sinks, together with a waste disposal unit and a dishwashing machine when fitted with a 50 mm trap and discharge pipe.

Comment: Commercial sinks – one water trap is not permitted to serve two adjacent commercial sinks, as a sink containing foul water may contaminate an adjacent sink being used for food preparation.

(4 marks)

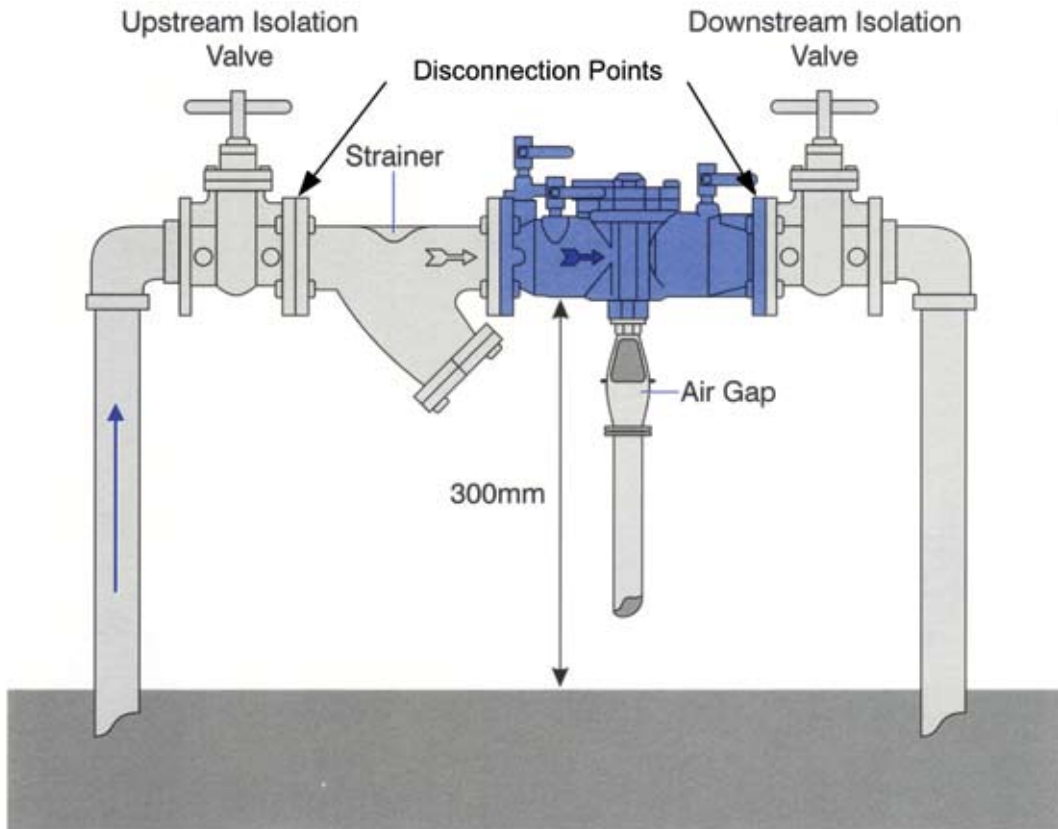
(d) 65 mm

(1 mark)

Total 8 marks

ANSWER 12

(a)



(1 mark)

- | | | |
|-----|----------------------|-----------------|
| (b) | Isolating valves | (½ mark each) |
| | Filter | (½ mark) |
| | RPZ device | (1 mark) |
| | Disconnection points | (½ mark each) |
| | Direction of flow | (½ mark) |
| | | (Total 4 marks) |

- (c) Have free ventilation to the atmosphere for the relief valve outlet at all times.
 Have the relief drain outlet located not less than 300mm above the surrounding ground.
 (2 marks)

Total 7 marks

ANSWER 13

Any FOUR:

The installation shall provide for:

- 1 Easy replacement
- 2 Easy access for maintenance and use of easing gear
- 3 A relief discharge pipe discharging to a visible position which does not present a hazard or damage to other building elements.
- 4 Must suit the pressure rating of the appliance
- 5 Must be located on the inlet pipework to the appliance
- 6 Must have a flow rate equivalent to the rate of cold water supply
- 7 When combined with the TPR valve should have an energy rating greater than that of the appliance

(4 marks)

Total 4 marks

ANSWER 14

(a) Any FIVE:

- 1 Water heaters shall be installed in accordance with the manufacturers' instructions.
- 2 The element or other heating device, thermostat, pipework connections and other accessories shall be readily accessible for inspection, maintenance and removal.
- 3 Seismic restraint must be provided, including provision to ensure that where fittings and pipework attached to a storage water heater pass through a supporting platform or floor, there is a 50 mm minimum clearance between the fitting and the support structure; and where the 50 mm clearance could permit the passage of vermin or moisture it is sealed with a flexible membrane.
- 4 Connection to the storage heater must be compatible with the pipe material used.
- 5 Drainpipes shall be provided for storage water heaters over 45 litres in capacity. The drainpipes shall have a conveniently located control valve and terminate with a cap or plug suitably located for easily emptying the vessel for maintenance.
- 6 A safe tray incorporating an overflow must be provided when water could penetrate another household unit within the same building.

Accessibility

Compatible material

Safe tray

Drainage

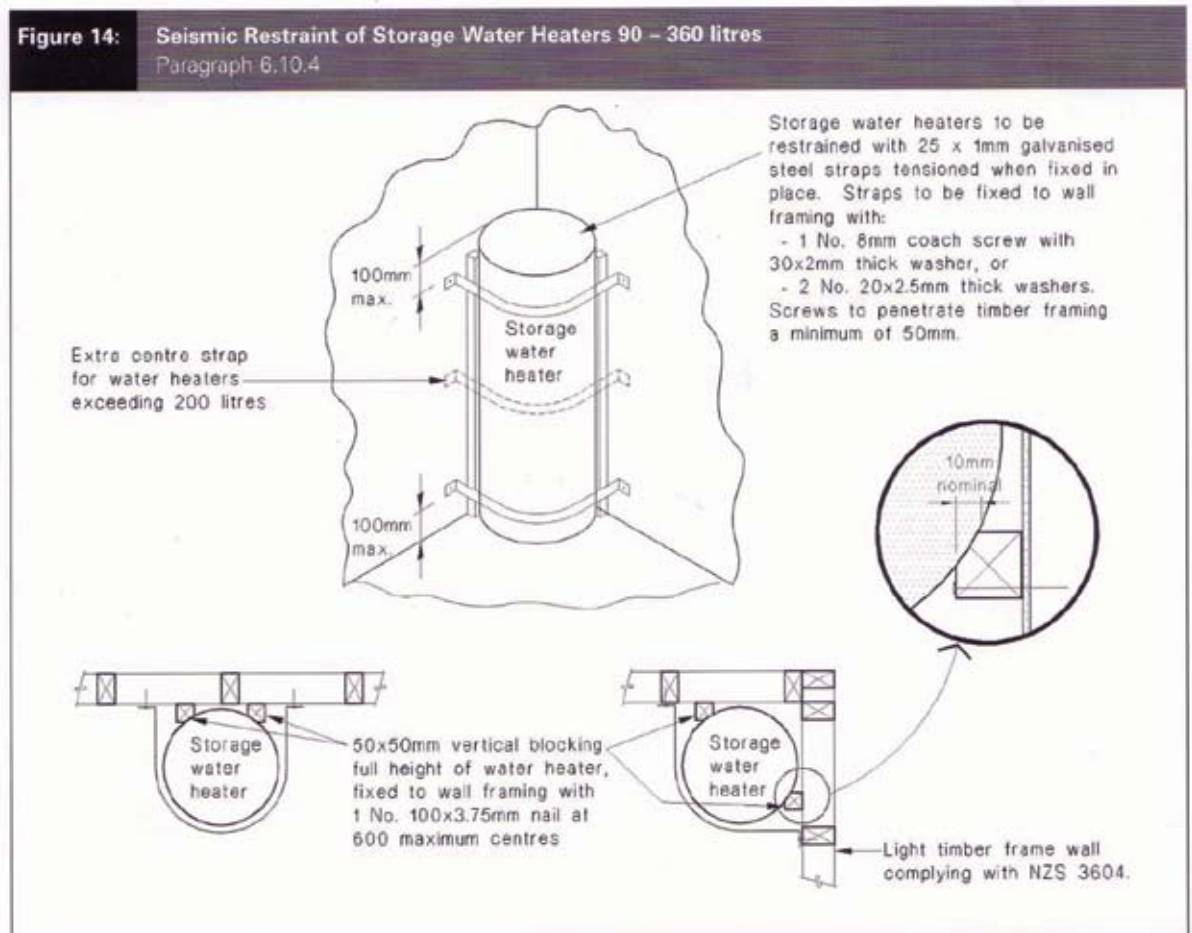
Seismic restraint

Manufacturers installation instruction

(1 mark each) (5 marks)

- (b) 1 25 mm x 1 mm galvanised straps must be provided to the top and bottom of the storage cylinder complete with appropriate tensioning devices. The galvanised straps must be securely fixed to the frame of the building. Cylinder over 200 litres require 3 straps.
- 2 Alternatively the bottom may be secured by the use of 100 mm x 50 mm timber nailed with 100 mm x 4 mm nails, but the top must be secured by a galvanised strap which must be securely fixed to the frame of the building.

(4 marks)



Total 9 marks

