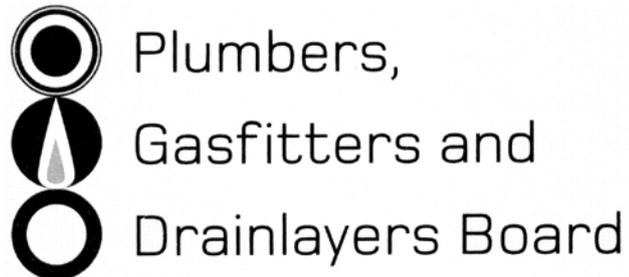


No. 9195



CRAFTSMAN EXAMINATION, JUNE 2007
PLUMBING

ANSWER SCHEDULE

ANSWER 1

(a) Any SIX:

The work of fixing or unfixing any sanitary fitting or appliance that is installed in any ship, aircraft or vehicle, or any plumbing work associated with any such sanitary fitting or appliance.

The work of fixing or unfixing a gas, electrical, or solar water heater that supplies or is intended to supply hot water to not more than one sanitary fitting or appliance.

The work of fixing or unfixing any other gas, electrical, or solar water heater in any case where fixing or unfixing of pipes supplying or intended to supply is not involved.

The work of fixing or unfixing a bedpan washer, a bedpan steriliser, or a washing machine in any case where the fixing or unfixing of waste pipes or of pipes supplying or intended to supply water is not involved.

The work of fixing or unfixing a pipe for reticulating hot water in any central heating system or a pipe supplying cold water from a tank or pressure reducing valve to a heating appliance used exclusively for a central heating system

The work of fixing or unfixing any shower that is installed over a bath and that is supplied with water through the bath taps.

The repair, or the replacement with a comparable heater, of any open-vented water storage heater using the same pipework but excluding any water storage heater connected to a solid-fuel heater or other supplementary heat exchanger, but only when the work (notwithstanding any notice issued under section 55 (1) of the Plumbers, Gasfitters and Drainlayers Act 1976) is done by a craftsman plumber, or by a registered plumber working under the direction of a craftsman plumber, or by the holder of a limited certificate working under the supervision of a craftsman plumber or registered plumber, or by any other person so authorised under section 53 of that Act.

The repair, or replacement with a comparable fixture or appliance, of any sanitary fixture or sanitary appliance using the same pipework, but only when that work (notwithstanding any notice issued under section 55 (1) of the Plumbers, Gasfitters and Drainlayers Act 1976) is done by a craftsman plumber, or a registered plumber working under the direction of a craftsman plumber, or by the holder of a limited certificate working under the supervision of a craftsman plumber or registered plumber.

The opening and reinstatement of any purpose-made access point within a drainage system that is deemed to be part of a building in accordance with section 3(3) of this Act.

(Any SIX, 1 mark each) (6 marks)

- (b)
- | | |
|---|------------------------------|
| 1 | 15 years |
| 2 | 5 years |
| 3 | 5 years – clause or 15 years |
| 4 | 15 years (or 50 years) |
| 5 | 50 years |
| 6 | 15 years (or 50 years) |

(½ mark each) (3 marks)

Total 9 marks

ANSWER 2

Cause	Remedy or Action
1 Not Primed	Prime
2 Excessive Suction lift	Reduce static suction lift, eliminate or reduce friction on suction side by use of larger pipes.
3 Air Leaks	Check and eliminate air leaks by sealing, check glands.
4 Vapour lock	Suction lift excessive for fluid temperature remedy one or other as appropriate.
5 Blockage	Check for blockage in suction pipe foot valve or strainer. Check suction valves.
6 Deterioration (i.e. wear and tear)	Check cylinder liner for wear, bucket leathers and valves.

(1 mark each cause) (1 mark each remedy) (10 marks)

Total 10 marks

ANSWER 3

(a) Lower limit = 20kPa (2m head)

Upper limit = 120kPa (12m head)

(2 marks)

- (b) (i) A riser is a pipe installed vertically within a building as the continuation of the water main to supply water.
- (ii) A dry riser main is a vertical pipe within a building that contains no water and is available to be used by the fire brigade to pump water up through a building to hydrants and landing valves in times of a fire.
- (iii) A wet riser main is also a fire main and kept full of water at pressure for use in times of fire.
- (iv) A staging tank is a tank used in high-rise buildings to store water at different levels to give control of water pressure and to provide extra storage of water throughout the building.

(1 mark each) (4 marks)

Total 6 Marks

ANSWER 4

$$Q^2 25L = D^5 H$$

$$D^5 = \frac{Q^2 \times 25L}{H}$$

$$Q = \frac{575}{60}$$

$$= 9.583 \text{ L/s}$$

$$\text{Diameter} = 5 \sqrt[5]{\frac{9.583 \times 9.583 \times 25 \times 420}{90}}$$

$$= 5 \sqrt[5]{\frac{964255.835}{90}}$$

$$= 5 \sqrt[5]{10713.954}$$

$$= 6.397 \text{ cm}$$

$$= 63.97 \text{ mm (65 mm pipe required)}$$

(6 marks)

Total 6 marks

ANSWER 5

- (a) The chamber housing the back-flow device must be watertight in that all precautions must be taken to ensure there is no ingress of water.

The chamber must be provided with an appropriate drain or pump system (so that the device is never submerged).

The discharge port of the relief valve must be 300mm above the floor of the chamber.

To enable a continuous 24 hour a day water supply, a fully protected bypass complete with a reduced pressure zone device will need to be installed in parallel to allow for repairs, testing or replacement.

The chamber must be large enough to allow easy access for replacement, repairs and testing.

The back-flow devices must be supported independently of pipework.

(1 mark each for any FIVE) (5 marks)

(b) A Dual Check Valve (which does not incorporate any test points)

A Dual Check Valve with atmospheric vent (which does not incorporate any test points.)

A vented double check valve.

Atmospheric vacuum breaker

Hose connection vacuum breaker.

(1 mark each for any FOUR) (4 marks)

(c) 1 As near as practical to the potential source of contamination.

2 In an accessible position to enable maintenance and inspection.

(2 marks)

(d) 1 An assembly of at least two independently operating force-loaded check valves.

2 Sufficient test points to allow each valve to be independently and regularly tested.

(2 marks)

(e) Any ONE:

Immediately upstream of the toxic fertiliser injector.

On the branch to the irrigation system.

(1 mark)

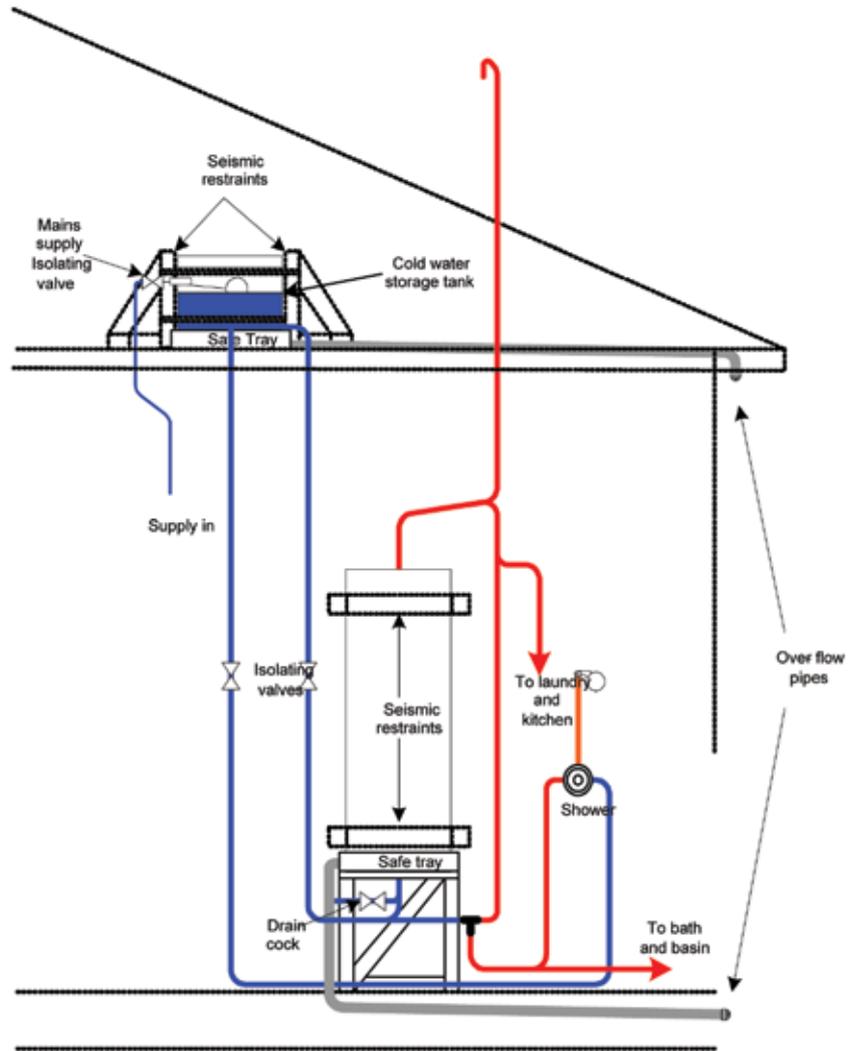
(f) 1 Pressure type vacuum breaker

2 Atmospheric vacuum breaker

Check answer against G12 and AS3500 (2 marks)

Total 16 marks

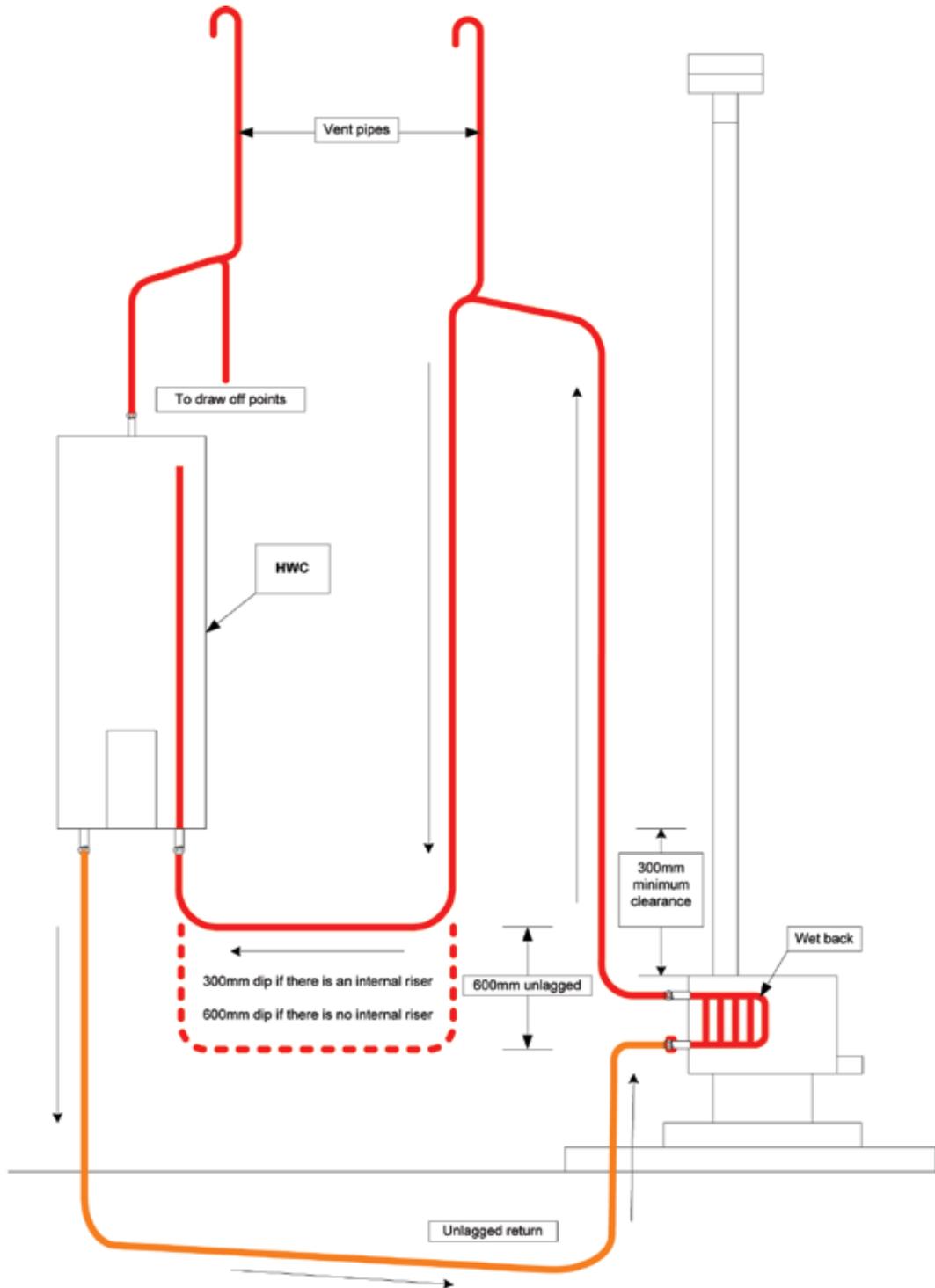
ANSWER 6



- Safe trays (2 marks)
- Seismic restraints (2 marks)
- Tempering valve (1 mark)
- Valving (2 marks)
- Cold supply to shower (1 mark)
- Cylinder Drain (1 mark)
- Venting (1mark)
- Safe tray drains (2 marks)

Total 12 Marks

ANSWER 7



- The storage unit (1 mark)
- The wet back heat exchanger (1 mark)
- The recommended heights between the storage cylinder and the wet-back (1 mark)
- Pipework including grades (flow 1 mark, return 1 mark)
- Correct venting (½ mark each, 1 mark)
- Lagging requirements (1 mark)

Total 7 marks

No valves or obstructions shall be installed in the piping (primary and return) between the heat source and the storage tank – zero marks awarded if this is done.

ANSWER 8

A free outlet storage water heater has an open outlet from the top of the cylinder to the discharge point (usually a sink).

Cold water is allowed to flow into the bottom of the cylinder displacing hot water out through the free outlet discharge point.

The free outlet is used as the expansion pipe and vent for the system in case of malfunction with the thermostat. The inlet must be restricted to be smaller than the outlet.

(5 marks)

Total 5 marks

ANSWER 9

(a) The discharge pipe of a Bidet shall be directly connected to a drain or soil pipe, or may discharge as a waste pipe to a gully trap.

(2 marks)

(b) Backflow protection must be incorporated either by air gap at a supply tank or RPZ backflow device.

(2 marks)

(c) 32 mm diameter

(1 mark)

(d) 1 unit

(1 mark)

(e) The vent may be omitted when the waste discharges under a gully grate and that waste is less than 3.5m in length or when it is the top fitting on a soil stack and is less than 3.5m in length.

(2 marks)

Total 8 marks

ANSWER 10

(a) Any FOUR:

Convey foul water from the building to a foul water drainage system

Avoid blockages.

Avoid leakages.

Prevent foul air and gases from entering the building.

Enable access for maintenance and clearing of blockages.

Avoid undue noise.

(Any FOUR ½ mark each) (2 marks)

(b) Any THREE:

The system must always have one open vent to atmosphere.

They must be located in an accessible position.

No smaller than the diameter of the vent pipe that it serves.

Where the valve is unlikely to become frozen.

Where it is protected from damage.

Where adequate air can enter the valve.

(3 marks)

(c) The purpose of an untrapped floor waste is to provide for accidental spillage or overflow from sanitary fixtures or appliances.

(2 marks)

(d) Any THREE:

The floor waste pipe must discharge to the outside of the building to the open air.

The floor waste pipe should terminate with a suitable vermin-proof flap or grill to prevent the passage of rodents.

Discharge to safe location.

Must have removable grating.

(Any THREE) (3 marks)

Total 10 marks

ANSWER 11

MULTI CHOICE

- 1 d
- 2 a
- 3 a
- 4 e
- 5 b
- 6 b
- 7 c

(Marking schedule 1 mark for each correct answer) (7 marks)

Total 7 marks

ANSWER 12

$$\begin{aligned}\text{True length} &= \sqrt{4.500^2 + 1.170^2} \\ &= \sqrt{4.500 \times 4.500 + 1.170 \times 1.170} \\ &= \sqrt{20.250 + 1.370} \\ &= \sqrt{21.620} \\ &= 4.650 \text{ m}\end{aligned}$$

Add overhang

$$\begin{aligned}4.650 + 0.065 \\ = 4.715 \text{ m (or 4715 mm)}\end{aligned}$$

(4 marks)

Total 4 marks

