higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

NOVEMBER EXAMINATION

PLUMBING THEORY N2

15 NOVEMBER 2013

This marking guideline consists of 8 pages.

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QUESTION 1

1.1 FLOCCULATION AND SEDIMENTATION

- After screening/straining, the water still contains suspended colloidal matter (small microscopic particles). By adding a coagulant (flocculent) these microscopic matter binds ('floc') together to form larger particles.
- After the coagulants are added, the water falls over weirs that assist with the mixing process and thus release gasses and odors in the water.
- The water then moves through large sedimentation tanks (also called settling tanks) to allow the heavier floc to settle at the bottom of the tanks. [These tanks needs to be de-sludged regularly.] (7)

1.2 OBJECT OF FILTRATION

To allow the untreated water to pass through layers of material while treated chemically to remove bacteria and microscopic suspended matter from the water. (2)

1.3 FUNCTIONS OF A SERVICE RESERVOIR

- Provides water to the consumer.
- Ensures an adequate reserve (usually two-three day supply) of water in case of an interruption to the supply from the water treatment plant or control reservoirs.
- Provides the necessary pressure head to the water mains.
- Convenient place to regulate and control the water supply and quality thereof. (Any 3 x 1) (3)

1.4

- It is water that contains the chlorides, sulphates and/or nitrates of
- Calcium and/or magnesium.
- These salts are held in solution without the presence of carbon dioxide. (4)

1.5

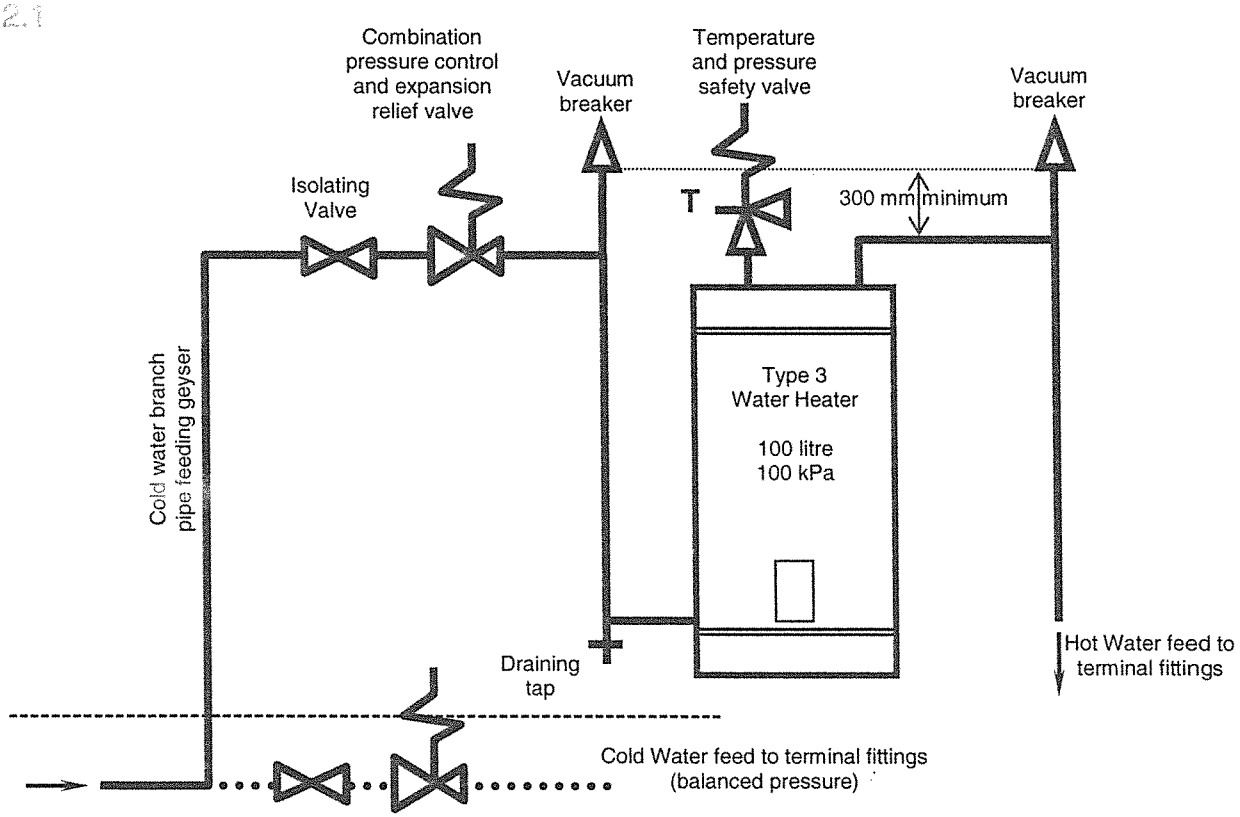
- Disease producing organisms of enteric (intestinal) origin.
- Toxic substances most frequently derived from industrial wastes but can also come from the careless use of insecticides etc.
- Biocides, even lead from lead pipes and -containers.
- Color, usually flushed from the nature of soil strata it passes through.
- Turbidity generally carried in suspension by the erosion of clay deposits.
- Organic matter that produce odors and tastes such as the odor of hydrogen sulfide upon decomposition.
- Carbon dioxide that enables water to take up calcium, magnesium and lead into solution.
- Iron and manganese are taken into solution in the absence of dissolved oxygen.
- Algae, which release characteristic odours and tastes.
- Disinfecting chlorine, which may produce objectionable tastes unless chlorination is well managed. (4)

[20]

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QUESTION 2

2.1



(10)

2.2 2.2.1 TEMPERATURE AND PRESSURE SAFETY VALVE ACTIVATED BY
EXCESSIVE TEMPERATURE
(+95˚C) [SABS 198:1992 (5,4)]

- When the temperature reaches 93-98 ˚C the very stable wax in the probe expands rapidly.
- The plug above the wax then exerts an upward force against the piston.
- The force overcomes the force in the spring and the piston with washer is lifted off the seat of the outlet.
- The water passage is thus opened and the very hot water is moved out.
- The water in the system is cooled by the incoming cold water.
- When the water reaches a temperature of not lower than 75 ˚C the wax contracts and the TP safety valve closes.

NOTE: an increase in temperature also leads to an increase in the pressure of the water in the system! (Any 6 x 1) (6)

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2.2.2 **TEMPERATURE AND PRESSURE SAFETY VALVE**

ACTIVATED BY EXCESSIVE PRESSURE
(1,5 TIMES IT'S NOMINAL PRESSURE RATING)
SABS 198: 1992

- The outlet of the TP-Safety valve is closed off by a washer that is spring loaded.
- When the force of the water (due to the pressure) overcomes the force in the spring,
- The washer is lifted off its seat and
- The water passage is opened.
- The water will then escape to the outside- this will decrease the pressure in the system. (Any 4 x 1) (4)

[20]

QUESTION 3

3.1 **Purpose of ventilation provision: (functions)**

1. A ventilation pipe (vent pipe) allows smelly gasses and pathogenic gasses to escape from the drainage installation at a safe height into the atmosphere.

2. It prevents gasses from accumulating in the drains and sanitary pipes which might exert a back-pressure on the water seals.

3. It also acts as an anti-syphonage provision – it admits air into the drainage installation thus maintaining atmospheric pressure on the stack of the water seal. This prevents the water seal being broken or adversely affected by syphonage and/or momentum (Any 2 x 2) (2)

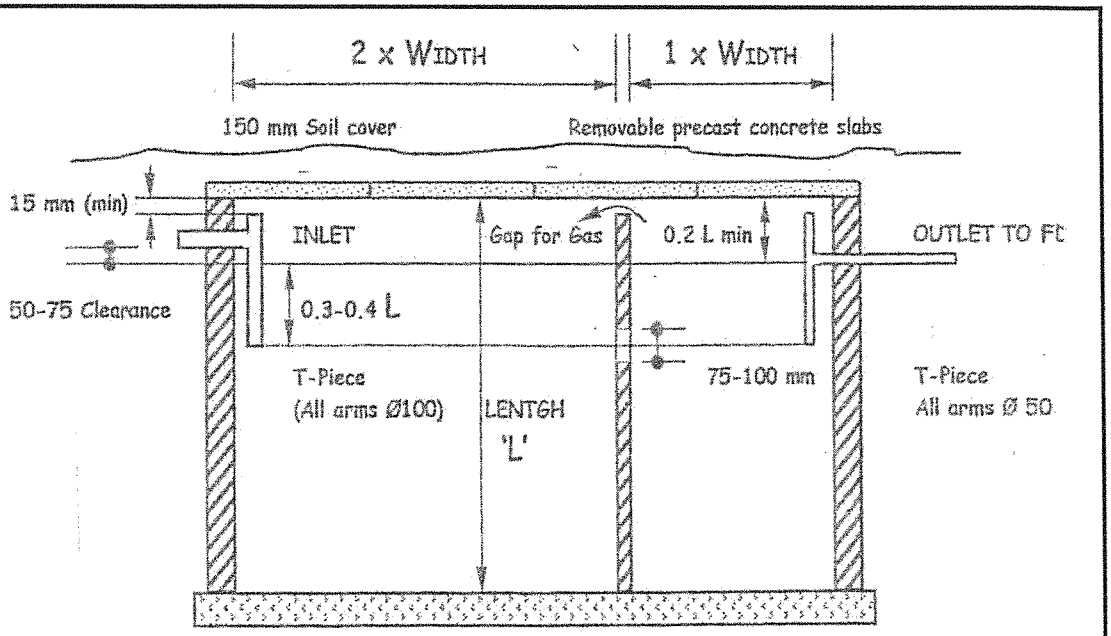
3.2 **Permanent access shall be provided for cleaning purposes in the following instances:**

1. At a point within 1,5 m of the connection of any drain to the connecting sewer, common drain or any sewage disposal unit on site. An access eye shall be installed immediately downstream of such point.
2. Every 25 m on a straight run of drain.
3. At the head of all drains.
4. At the head of any branch drain longer than 6 m.
5. Immediately before and after a drain runs under a building.
6. Change of direction that exceeds 45° if a long radius bend is not used. A maximum of two changes of 90° shall be permitted between two rodding eyes.
7. On a stub stack in a closed drainage system.

(Any other appropriate instance 4 x 1) (4)

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3.3



Sketch		**(4)**
Labels	**6 x ½**	**(3)**

(10)

3.4 LOCATING OF DEFECTS

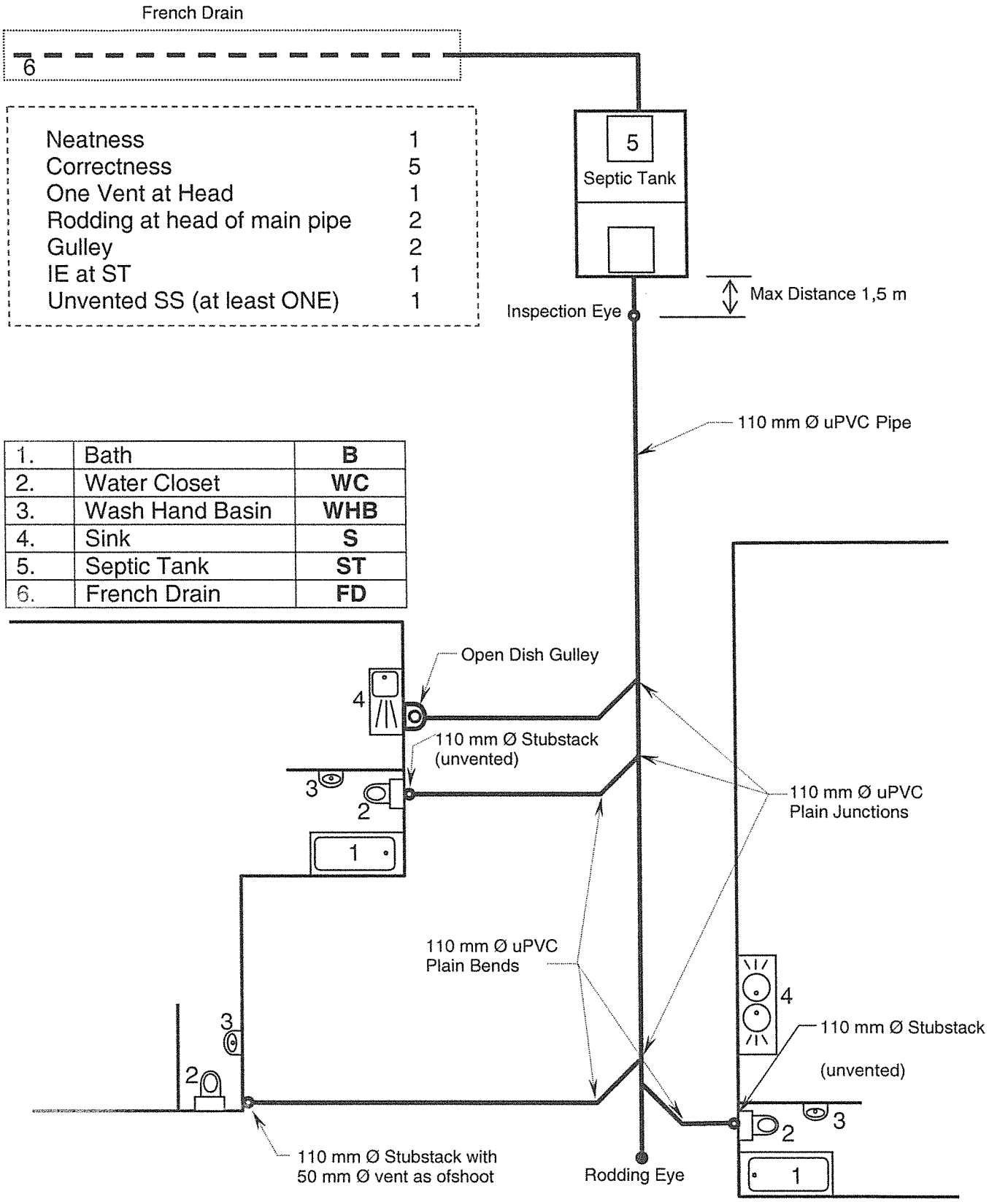
1. The pipework can be subjected to an internal pressure and a soap solution applied to the joints, plugs and pipes where the plumber suspects such defects to be. This method is, however only suitable for small drainage installations.

2. A smoke-producing machine can be used to introduce smoke under pressure into the installation. Leakages can be observed as the smoke escapes. This method should be applied carefully. It is also not suitable for installations with ABS, Upvc, MuPVC and rubber jointing. The naptha used to produce the smoke has a detrimental effect on these materials.

3. The installation can be filled with water to detect leaks. The installation can be tested in sections. Care should be taken to ensure that no part of the installation is subjected to a static pressure of more than 5m head of water (50 kPa). (Any 2 x 2) (4)

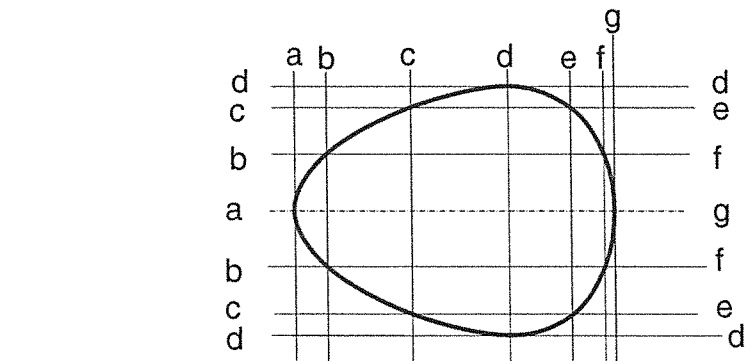
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3.5

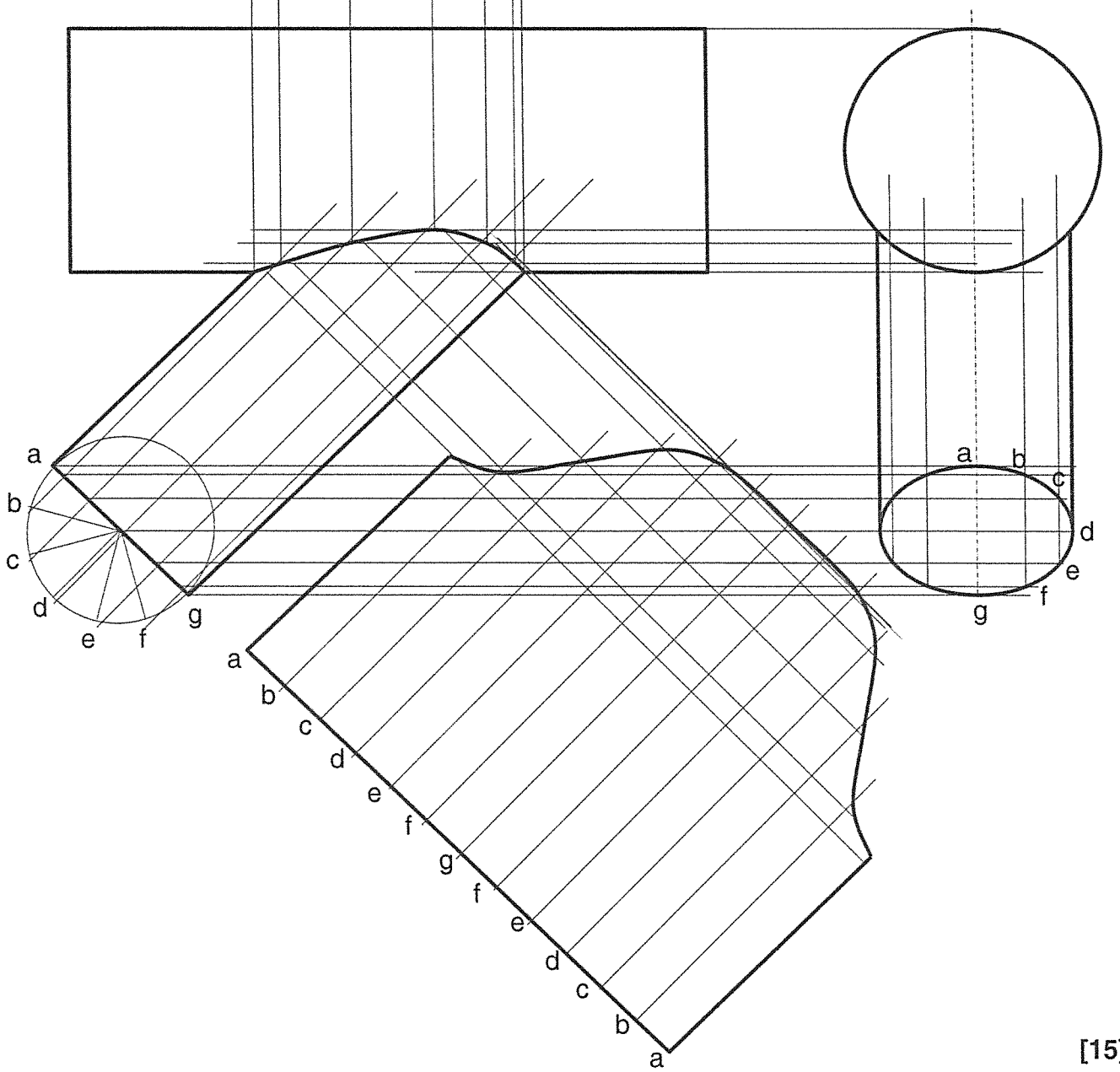

French Drain
6
Neatness 1
Correctness 5
One Vent at Head 1
Rodding at head of main pipe 2
Gulley 2
IE at ST 1
Unvented SS (at least ONE) 1
5
Septic Tank
Max Distance 1,5 m
Inspection Eye
110 mm Ø uPVC Pipe
1. Bath B
2. Water Closet WC
3. Wash Hand Basin WHB
4. Sink S
5. Septic Tank ST
6. French Drain FD
Open Dish Gulley
4
110 mm Ø Stubstack
(unvented)
3
2
1
110 mm Ø uPVC
Plain Junctions
110 mm Ø uPVC
Plain Bends
4
110 mm Ø Stubstack
(unvented)
3
2
2
3
110 mm Ø Stubstack with
50 mm Ø vent as ofshoot
Rodding Eye
1

(15)
[35]

QUESTION 4



Front View	1
Side View Complete	2
Curve of interpenetration	4
Pattern of Branch Pipe	4



[15]

QUESTION 5

MATERIAL LIST			
DESCRIPTION	QUAN-TITY	UNIT PRICE	TOTAL
15 mm pipe class ii copper tubing	33 - 38 m		
22 mm pipe class ii copper tubing	11-15 m		
22 mm 600 kPa Combination Pressure Control & Relief Valve	1		
150 litre x 600 kPa Geyser complete with TP- valve & drain cock	1		
22 mm Stopcock	2		
22 mm Vacuum Breakers	2		
22 mm Fullway Valve	1		
15 mm Fullway Valve	2		
22 mm Equal Tee Piece	7		
22 x 22 x 15 Tee Piece	3		
22 x 15 x 15 Tee piece	2		
22 x 15 x 22 Tee Piece	1		
		Vat @ 14 %	
		TOTAL	

(Any 1 x 5 descriptions)
(Any 1 x 5 quantities)

[10]

TOTAL: 100

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