



**higher education  
& training**

Department:  
Higher Education and Training  
**REPUBLIC OF SOUTH AFRICA**

# **MARKING GUIDELINE**

**NATIONAL CERTIFICATE**

**PLUMBING THEORY N2**

**1 AUGUST 2018**

**This marking guideline consists of 7 pages.**

**QUESTION 1: COLD-WATER SUPPLY**

- 1.1      1.1.1      Sterilisation is the addition of chlorine to the water✓ to make the water free from harmful bacteria so as to be used for human consumption.✓
- 1.1.2      Pressure zone is a division of the reticulation network of a suburb✓ where the water is supplied from a certain reservoir serving a particular area.✓
- 1.1.3      Filtration is the process in water purification that removes bacteria✓ and finely divided clay and colloidal matter smaller than the openings between the sand grains, through layers of sand.✓ (6)
- 1.2
  - Colourless
  - Tasteless
  - Odourless
  - Clear and sparkling
  - Free of germ (Any 4 × 1) (4)
- 1.3      Water hammer is the noise heard when taps were sudden closed, air trapped in the pipeline✓ or sometimes due to pipes that are not properly saddled to the wall.✓ (2)
- 1.4
  - Failure to fit supply pipes properly to ceiling joists or other fixtures that support the pipes.
  - Connecting primary flow pipes and primary return pipes the wrong way round.
  - Closing a tap or a valve too quickly, produces a shock wave through the pipe and causes vibrations, if the pipe is not fitted properly.
  - Lime deposits in the pipe system restrict the water flow especially in gravity type or combination type hot-water systems and faulty washers, especially in a higher pressure installation. (Any 3 × 1) (3)
- 1.5
  - Close all taps slowly and gently.
  - Fit an air-release valve at the top of the water supply system.
  - Install a water hammer arrestor.
  - Do not use long pipe runs.
  - Secure any long pipe runs to the rafters or the walls using plastic pipe clips as supports. (Any 3 × 1) (3)
- 1.6
  - Air in the water pipeline can lead to an increase of burst pipes especially FC pipes.
  - It causes discomfort to the consumers due to spluttering of the water when a cold-water tap is opened.
  - When the air mixes with the water under pressure, it gives the water a milky appearance and this can influence the taste. (Any 2 × 1) (2)

**[20]**

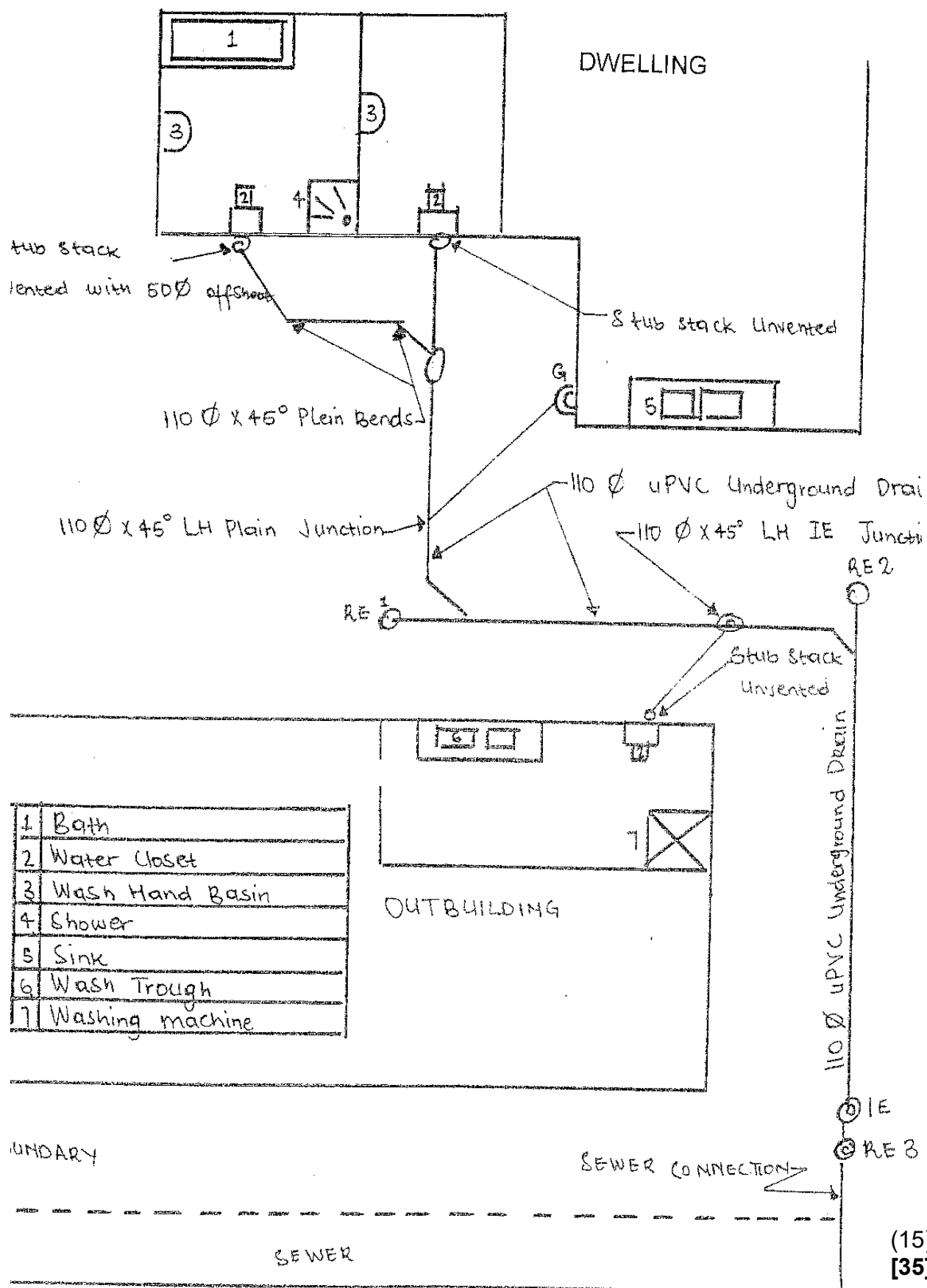
**QUESTION 2: HOT-WATER SUPPLY**

- 2.1
- Yellow
  - Orange
  - Blue
  - Black
- (4)
- 2.2
- It reduces the incoming mains pressure to a prescribed pressure rating.
  - It maintains or controls this pressure when the system is not in use.
- (Any other correct explanation) (2)
- 2.3 **ADVANTAGES**
- It has a simple design.
  - It has low maintenance cost.
  - It is easier to install than other geysers.
  - It does not require an expansion pipe through the roof.
  - It does not need an extra supply tank.
  - It is cheaper than other geysers.
  - It does not take up a lot of space.
- (Any 2 × 1) (2)
- DISADVANTAGES**
- The water pressure is quite low because of the height limit.
  - The water flow can be slow, because of the low pressure.
  - There is very little reserve water in the tank.
  - Modern mixers cannot be used as the water pressure is too low.
  - Airlocks can occur in the hot-water pipes.
- (Any 2 × 1) (2)
- 2.4 It is to feed the geyser with water at an acceptable pressure. (1)
- 2.5 Both supply tank and pressure-control valve, control the pressure of water to an acceptable pressure rating to the geyser✓ and therefore they cannot be used at the same time.✓ (2)
- 2.6
- Latitude
  - Orientation
  - Vapour
  - The time of day
  - The season
  - The atmospheric condition (atmosphere)
- (Any 4x1) (4)
- 2.7
- The system is not very effective in periods when there is no direct sunlight
  - It is a costly installation
  - It can be unsightly on the roof tops
  - Adds extra weight load to the roof structure
- (Any 3x1) (3)
- [20]**

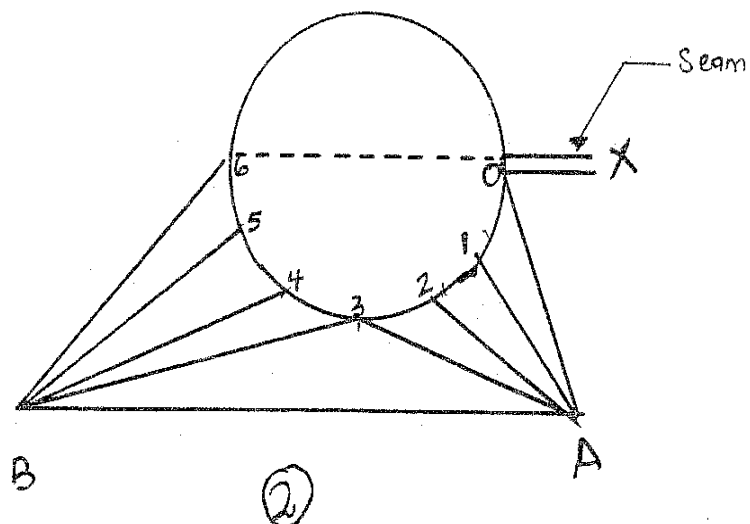
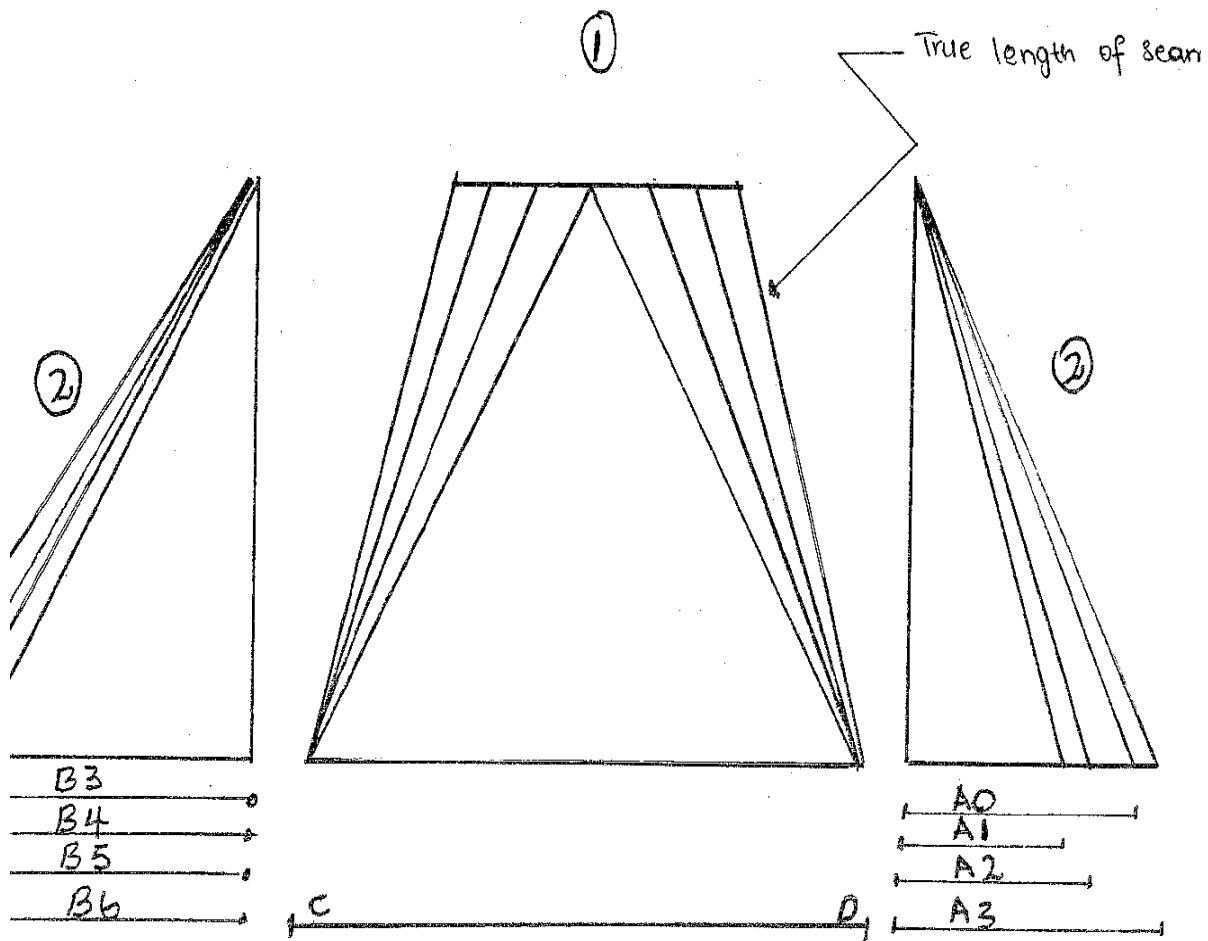
**QUESTION 3: DRAINAGE**

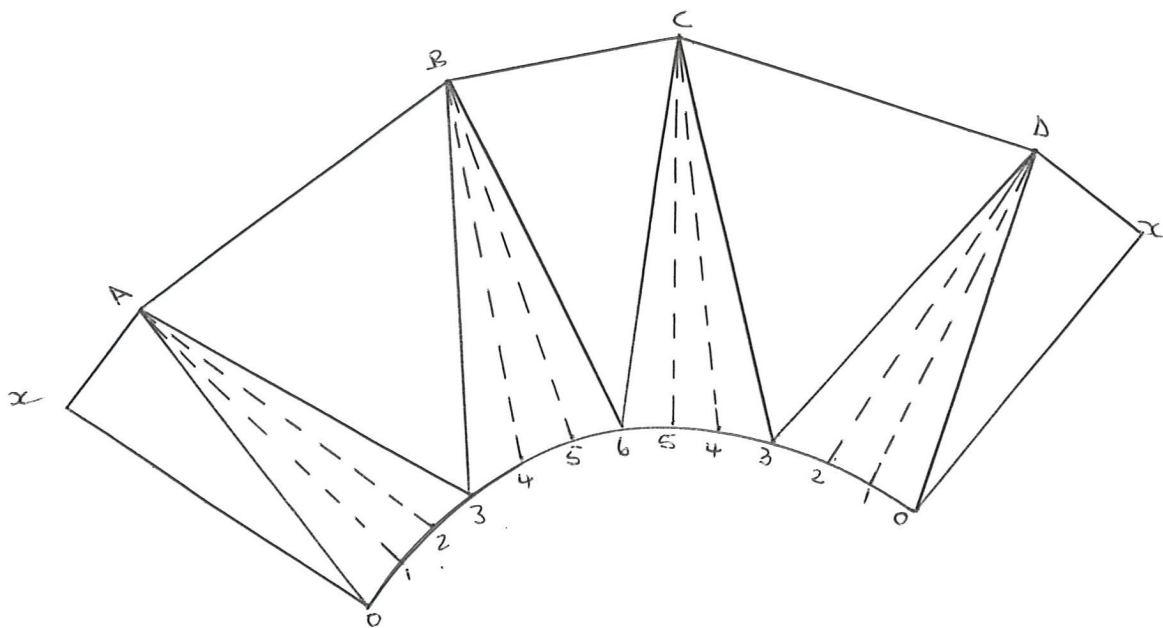
- 3.1
- A drain should be laid according to the approved plan.
  - Alignment must be true.
  - The invert depth should be correct.
  - The drain should have an effective self-cleaning gradient.
  - The soil cover should be at least 300 mm.
  - Sufficient access shall be provided.
  - The drain must be supported and protected with concrete where necessary.
  - The drain must be laid on a solid base.
  - Rodding eyes and gullies must be properly compacted and supported.
  - Also ensure that the installation is covered in accordance with the regulation. (Any 5 × 1) (5)
- 3.2
- Each test hole shall have a diameter of approximately 150 mm and
  - shall have a depth of approximately 400 mm.
  - Thoroughly scarify the sides and
  - bottom of each test hole with a sharp pointed instrument.
  - Remove all the loose material from the test holes.
  - Line each test hole with a polyester filter fabric and cover its bottom with a 50 mm layer of pea coal.
  - Fill the test hole with water to a depth of 300 mm.
  - Measure the percolation rate as prescribed in SABS 0250-2 (7.3.2.5). (Any 6 × 1) (6)
- 3.3
- The organic matter is fermented and
  - decomposed by the action of aerobic bacteria, microorganisms, maggots and worms and
  - settle to the bottom of the tank as a sludge.
  - Fats and grease that are not retained in the grease trap, are also collected in the scum layer and usually remain there. (4)
- 3.4
- |       |              |  |
|-------|--------------|--|
| 3.4.1 | Water meter  |  |
| 3.4.2 | Septic tank  |  |
| 3.4.3 | Shower       |  |
| 3.4.4 | Cleaning eye |  |
| 3.4.5 | Manhole      |  |
- (5 × 1) (5)

## 3.5 (DIAGRAM SHEET 1)

(15)  
[35]

**QUESTION 4: SHEET METAL WORK AND FLASHING**



**QUESTION 4: Continued**

Arc	2
Line quality	1
Base lines	4
Neatness	1

TOTAL: 7 + 8 = 15

[15]

**QUESTION 5: CALCULATIONS**

DESCRIPTION	QUANTITY
22 mm copper pipe class 460/2	4 m – 5 m
1,5 mm pipe class 460/2	0,4 m – 1 m
22 mm – 600 kPa combination pressure-control and pressure-relieve valve	1
150 litres × 600 kPa geyser complete with TP valve and drain cock	1
22 mm stop cock	2
22 mm vacuum breaker	2
22 mm full-way valve	1
15 mm full-way valve	2
22 mm equal T-piece	7
22 × 22 × 15 T-piece	3
22 × 15 × 15 T-piece	2
22 × 15 × 22 T-piece	1
<b>Award 1 x 10 marks for correct description / quantities. Additional responses can be accepted.</b>	

[10]

TOTAL: 100