higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

BUILDING AND CIVIL TECHNOLOGY N3

19 April 2021

This marking guideline consists of 9 pages.

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QUESTION 1

1.1
- Take reasonable care for the health and safety of themselves and of the persons who may be affected by their actions or omissions.
- Cooperate with any duties or requirements imposed by the employer or any other person concerning this Act, so that it may be performed.
- Carry out and obey any lawful order given regarding the health and safety rules and procedures laid down by the employer or anyone authorised by his employer, in the interest of health and safety.
- Report all situations which are unsafe or unhealthy that come to employees' attention, as soon as practicable. These situations should be reported to the employer or the health and safety representative of the workplace or section thereof, as the case may be, who will in turn report it to the employer.
- Report incidents or accidents in which employees themselves were involved and which may have affected their health or have caused injuries to themselves, to the employer.
- The provision and maintenance of systems of work, plant and machinery that is far as is reasonably practicable, are safe and without health risk.
- Taking such steps as may be reasonably practicable to eliminate or mitigate any hazard or potential hazard to the safety or health of employees, before resorting to personal protective equipment.
- Making arrangements for ensuring, as far as is reasonably practicable, the safety and absence, of risk to health in connection with the production, processing, use, handling, storage or transport of articles or substance.
- Providing such information, instructions, training and supervision as may be necessary to ensure, as far as is reasonably practicable, the health and safety at work of his employees.
- As far as reasonable practicably, not permitting any employee to do any work or to produce, process, use, handle, store or transport any article or substance or to operate any plant or machinery, unless the precautionary measures contemplated or any other precautionary measures which may be prescribed have been taken.
- Taking all necessary measures to ensure that every person in his employment or on-premise under his control where plant or machinery is used complies with the requirements of the Act.
- Enforcing such measures as may be necessary for the interest of health and safety.
- Ensuring that work is performed and that plant or machinery is used under the general supervision of a person trained to understand the hazards associated with it and who has the authority to ensure that precautionary measures taken by the employer are implemented.
- Causing the employees to be informed regarding the scope of their authority as contemplated in the Act. (Any applicable 4 × 1) (4)

1.2 1.2.1 Leadership is the ability and skills to influence others✓ to act together to accomplish a specified objective.✓

1.2.2 It is the process which allows management to think about the future✓ and decide what to do.✓

1.2.3 It is the mutual exchange of ideas✓ and the interpretation of messages and signals.✓

(3 × 2) (6)

1.3 The contractor has to:

- Enclose the site
- Set out the structure according to the block plan
- Arrange for a water connection from the local authority
- Attend meetings before the commencement of work and during construction
- Work in close cooperation with the staff and builder's main office
- Honour the defects liability clause in the contract
- Decide whether he/she is capable of doing the work, whether he/she can complete the work following the architect's wishes (as stated in the BOQ drawings & specifications)
- Carry out a full investigation of the site so that nothing, which may affect the tender price, is overlooked.
- To submit a tender price to the architect within the stipulated period.
- Attend meetings before the commencement of work and during construction. **Repetition**
- Carry out all the necessary planning and retain the services of the subcontractors that are needed.
- Draw up all the necessary charts regarding plant, labour, materials, subcontractors, etc. for the erection of the project.
- Exercise proper control and to ensure that programmes are adhered to and crucial dates are met.
- Work close in close co-operation with professional staff and the builder's main office. **Repetition**
- Ensure that the work is carried out following the plan and the wishes of the architect. **Repetition**
- Supply the quantity surveyor with all necessary data for drawings up of the final certificates and extra-contractual payments.
- Honour the defects liability clauses in the contract. **Repetition**
- Arrange for an electrical point on-site as required by the electrical city engineer.
- Arrange with Telkom for a communication line.
- Closes of the site. **Repetition**
- Sets up a storage hut and office.
- Sets up a board indicating who is in charge of the building operations, and so on.
- Provide toilets facilities for the employees.
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- Arranges with the protective services department (traffic) for an entrance that will not hinder traffic flow.
- Finds a reasonable parking facility.
- Cleans and levels the site.
- Surveys and locates the necessary levels.
- Sets out the structure according to the block plan. **Repetition**
- Prepare orders for delivery of material.
- Appoints building team as and when required on the site.
- Appoints a foreman, supervisors, and so on.
- Briefs the architect on the progress made, and subsequent payment to employees.
- Hand the project over on completion. (6)

[16]

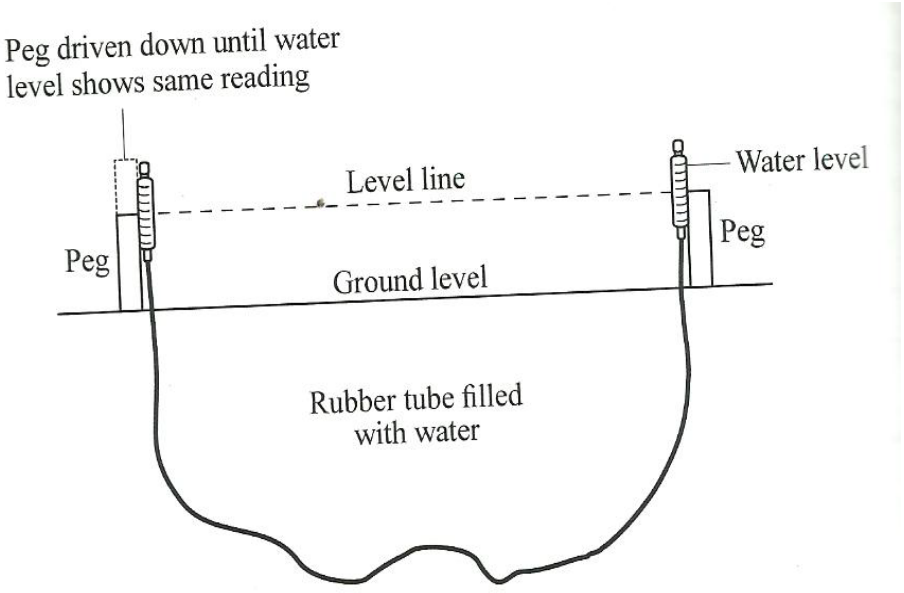
QUESTION 2

2.1
- Pile foundation
- Cantilever column foundation
- Reinforced pad foundation
- Mass concrete foundation
- Float or raft foundation
- Combined column foundation
- Reinforced steel strip foundation
- Isolated or pad foundation
- Strip foundation
- Raft foundation
- Column foundation
- Cantilevered foundation
- Short bore-piled foundation
- Mass concrete strip foundation
- Reinforced steel strip foundation (Any 4 × 1) (4)

2.2
- Notify the owners of adjoining buildings and give them all the relevant information.
- Carry out a detailed inspection of the building and record any defects, cracks, etc. Take photographs as evidence of what is found.
- Check the levels at certain points and record them. Continue to check these levels during construction to see if there is any movement.
- Carry out soil tests to determine the cause of settlement. These tests will allow you to apply the correct remedial measures.
- Remove any imposing loads and apply shoring where required.
- A detailed survey of the particular area should be carried out and substantiated by photographs and the signature of the owner of the building.
- Notice should be given to adjoining occupants, their consent obtained and agreement reached on the commencement date of work.
- Telltales (thin glass coated with plaster of Paris) should be fixed where there are exciting cracks, to indicates any further movement.
- As soon as operations are about to start, all moveable dead loads should be removed from the structure.
- The structure must be cordoned off by the contractor or protection unit force

(Any 4 × 1) (4)

2.3



(6 marks for labels)
(2 marks for correct sketch) (8)
[16]

QUESTION 3

3.1
- The quantity of water used
- The grading of aggregate
- The ratio of the aggregate
- The duration of the mixing process
- The compaction of the mixture
- The weather condition during curing
- The method of placing
- Age of the cement
- Curing
- Types of concrete mix
- Cement: water ratio
- Quantities and mixture ratios
- Compaction (Any 4 × 1) (4)

3.2 Water = Ratio × cement✓
= 0,5 × 600✓
= 300 litres✓ (3)

3.3
- Ordinary Portland cement
- Rapid-hardening cement
- Portland blast-furnace cement
- Sulphate-resisting Portland cement
- Special Portland cement
- White cement (Any 5 × 1) (5)

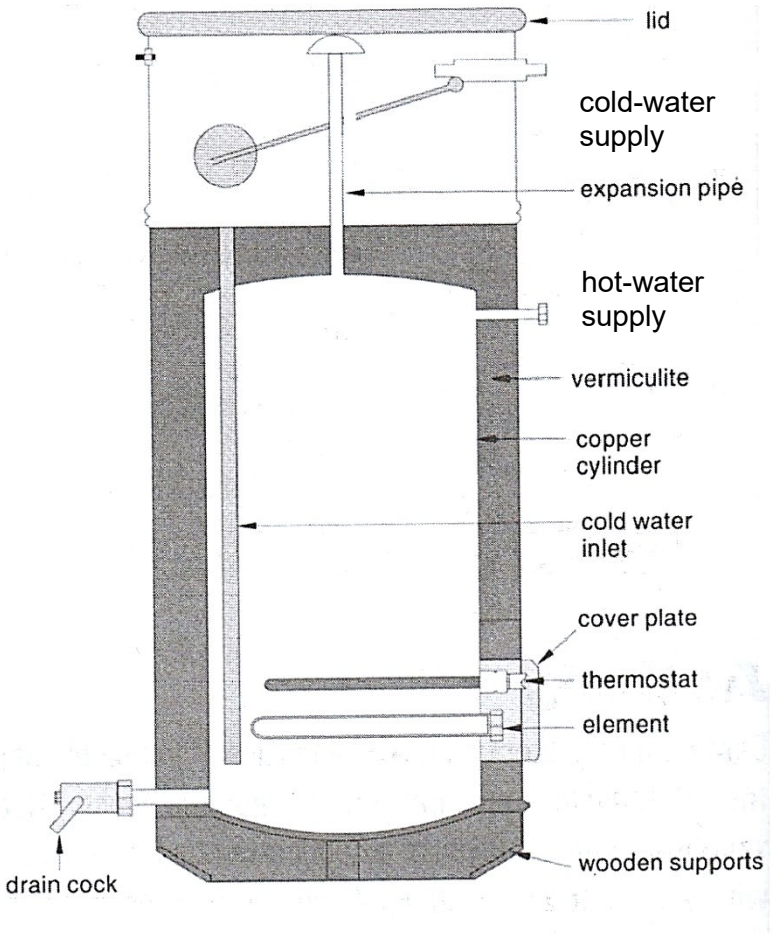
3.4
- The mix should not dry out on its way.
- Segregation of materials should be avoided at all times.
- Concrete when cast should be properly compacted in its final position as soon as possible.
- A mixture of concrete should be taken from the mixer in one operation (Any 3 × 1) (3)

3.5 Slump test (1)
[16]

QUESTION 4

4.1
4.1.1 V4
4.1.2 V6
4.1.3 V8
4.1.4 M4
4.1.5 M6
4.1.6 M8
(6 × 1) (6)

4.2



(8 marks for labels)
(2 marks for correct sketch) (10)
[16]

QUESTION 5

5.1.
- Rinse the surface with clean water.
- Clean the surfaces such as galvanised iron with a pre-cleaner.
- When the surface is dry apply a coat of primer and allow it to dry.
- Apply two coats of finishing.
- Allow the recommended drying time after each coat.
- Apply a light sanding before the final coat. (4)

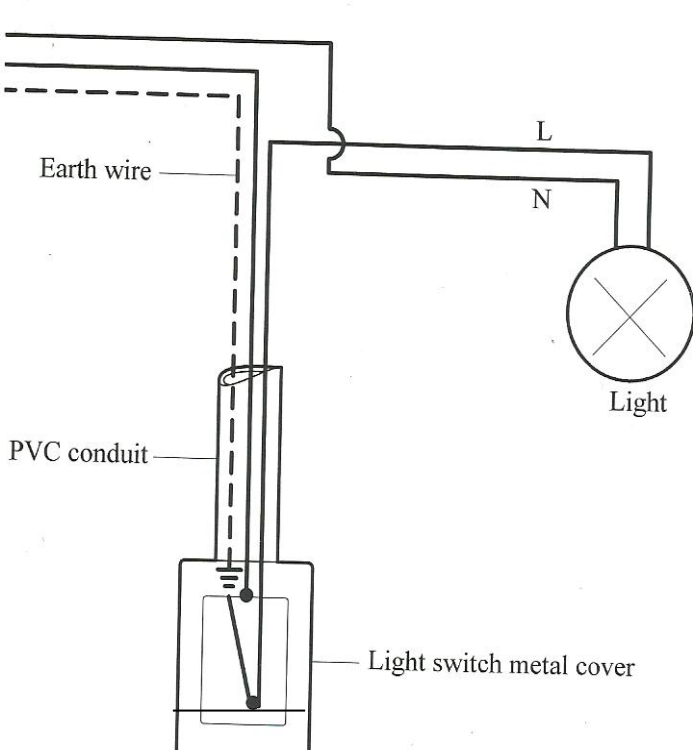
5.2 5.2.1 In public buildings (hospitals and offices)

5.2.2 In schools and offices where there are no grease or oil

5.2.3 On factory floors

(3 × 1) (3)

5.3



(4 marks for labels)
(2 marks for correct sketch) (6)

5.4
- Electricity is a movement of electrons similar to the movement of water through the system of water pipes in a building,
- except that for practical purposes the movement of electrons or current is instantaneous once the system is switched on
- unlike water which moves at a fairly slow rate.

(3)
[16]

QUESTION 6

6.1 6.1.1 Formation – the prepared subgrade on which the pavement is constructed or means the surface of the ground in its final shape after the completion of the earthworks

6.1.2 Subbase – a secondary layer of materials provided between the formation and the base or concrete that may consist of a layer of sand, ashes or similar material between the subgrade (subsoil) and the foundation. Its purpose is usually to act as a porous layer

6.1.3 Wearing course – the top layers of the surfacing which carries the traffic

6.1.4 Base course – the layer sandwiched between the wearing course and the road base or this is the bottom layer of a bituminous road, which acts as a cushion to the wearing course (surfacing)

(4 × 2) (8)

6.2 6.2.1 Area of wall = 15 × 2,7✓
= 40,5 m^2✓

Door opening = 2 × 1
= 2 m^2✓

Window opening = 2 × 1,5
= 3 m^2✓

Total area = 40,5 m^2 – (3 + 2)✓
= 35,5 m^2✓ (6)

6.2.2 Number of bricks required = 35,5 × 100
= 3 550 bricks (2)

6.2.3 Amount of sand required = 3 550/10 000
= 3,55 tonnes (2)

6.2.4 Labour cost = 35,5 × 100
= R3 550,00 (2)
[20]

TOTAL: 100

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