higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

CONCRETE STRUCTURES
NQF LEVEL 2

17 November 2022

This marking guideline consists of 6 pages.

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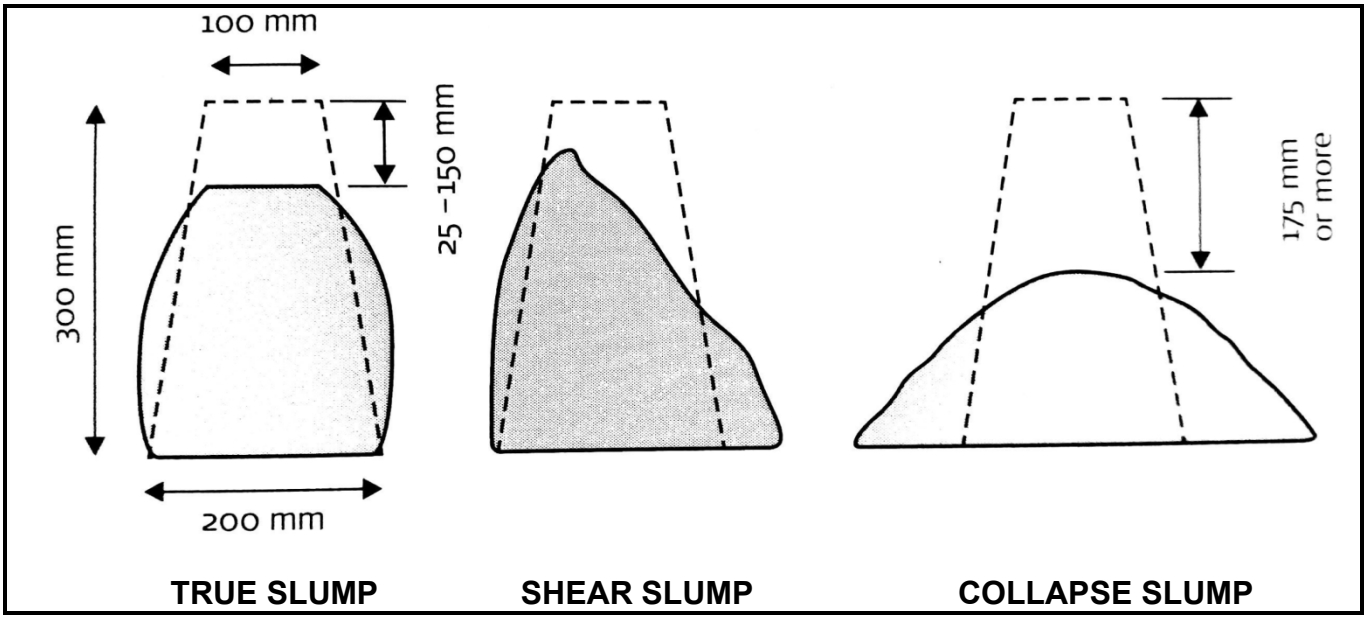
QUESTION 1

1.1
- The first reinforced concrete bridge in 1889
- The first concrete street built by George Bartholomew in Bellefontaine, Ohio, in 1891
- The first concrete high-rise (the Ingalls Building) in Cincinnati, Ohio, in 1903
- The first mile of rural concrete pavement in Wayne Country, Michigan, in 1909 (4)

1.2
- The formwork must not bend or move under any planned load.
- Set the formwork accurately according to the specifications of the engineer who designed it.
- Properly seal the formwork joints to prevent unnecessary loss of concrete.
- Design the formwork so that it can be easily managed. It must be easy to set up, get to and remove the formwork. (Any 3 × 2) (6)

[10]

QUESTION 2



MARK ALLOCATION	
Correct drawing	2
Naming/Title	1
Dimension	2
TOTAL	**5**

MARK ALLOCATION	
Correct drawing	1
Naming/Title	1
TOTAL	**2**

MARK ALLOCATION	
Correct drawing	1
Naming/Title	1
Dimension	1
TOTAL	**3**

[10]

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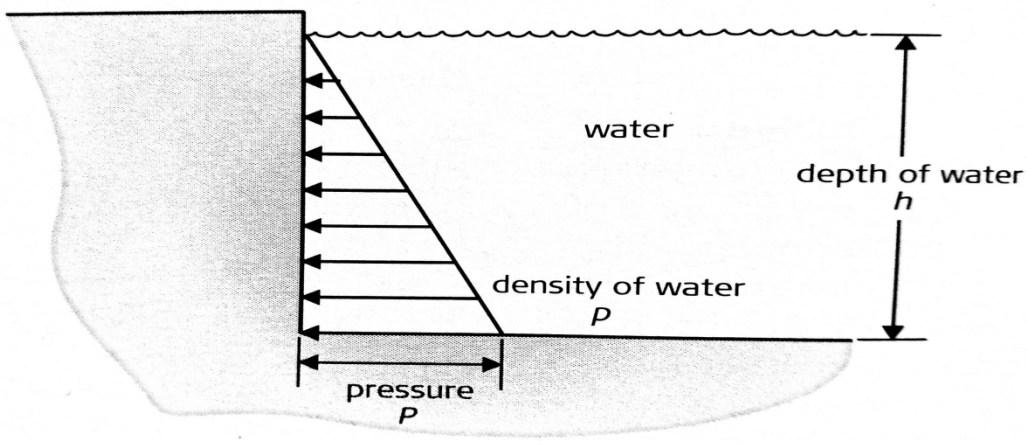
QUESTION 3

3.1 3.1.1 Soldiers are tall narrow pieces of timber or steel that stiffen and increase the strength of the formwork by giving the panels extra support.

3.1.2 Walings are used to fasten and fix together panels used to make formwork.

(2 × 2) (4)

3.2



TRIANGULAR HYDROSTATIC PRESSURE DIAGRAM

MARK ALLOCATION	
Correct drawing	5
Labelling	2
TOTAL	**7**

(7)

3.3 3.3.1 Hydrostatic pressure
3.3.2 Liquid density
3.3.3 Force of gravity
3.3.4 Height of liquid above

(4 × 1) (4)

[15]

QUESTION 4

4.1 4.1.1 Waler
4.1.2 Soldier
4.1.3 Ferrule
4.1.4 Kicker
4.1.5 Cross brace
4.1.6 Stay
4.1.7 Strap
4.1.8 Strong back

(8 × 1) (8)

4.2
- Joins panels together with other panels
- Puts together column boxes
- Joins waling to panels
- Joins column boxes to panels
- Joins soldiers to panels and waling (Any 4 × 1) (4)

4.3
- Prevents the formwork from sticking to the concrete
- Gives a uniform concrete surface
- Easy to apply to formwork
- Ensures that the formwork can be reused
- Ensures that the formwork is durable
- No bad effect on formwork or concrete
- Allows for the plastering and finishing of the surface of cured concrete

(Any 6 × 1) (6)

4.4
4.4.1 True
4.4.2 True
4.4.3 True
4.4.4 False
4.4.5 False
4.4.6 False
4.4.7 True

(7 × 1) (7)
[25]

QUESTION 5

5.1
- PVC
- Rubber
- Metal or stainless steel (3)

5.2
5.2.1 Expansion joints are used to separate new concrete from existing or adjacent constructions.

5.2.2 Movement joints allow relative movement of structure parts that are next to each other in a controlled or uncontrolled way without affecting the quality or working of the structure.

(2 × 2) (4)

5.3
- At the top of columns and walls
- At the floor level
- In columns and walls 75 mm to 150 mm above floor level
- In beams at points of minimum bending movement where the steel is the lightest
- In beams over supports (Any 3 × 1) (3)

[10]

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QUESTION 6

6.1 Chemicals/Poison (1)

6.2
- Helps with easy removal
- Does not cause blemishes or softens concrete surfaces
- Does not interfere with stickiness of plaster or paint applied later to concrete
- Noncorrosive to surface forms
- Does not promote the formation of air pockets
- Remains in liquid form at all temperatures
- Does not separate in long-term storage conditions
- Easy to apply (Any 6 × 1) (6)

6.3
- Each time the formwork is used (but only after cleaning)
- Before fixing reinforcement
- According to the methods at the coverage recommended by the manufacturer (3)

[10]

QUESTION 7

7.1

7.1.1 **FORMWORK CHECKLIST**✓			
Project: Name of choice✓			
Inspection	**Comments**	7.1.2 **Checked by (print name)**✓	**Signature**
Joint between walls/columns and kickers correctly positioned and sealed grout tight		Name of choice ✓	Signature of choice✓
7.1.3 Wall and columns plumb and correctly positioned✓			
All services (electrical conduits, downpipes, service ducts and water pipes) in place according to drawings and specifications			
Conduits and service ducts have a double draw wire visible at either end to facilitate drawing of conductors at a later stage			
7.1.4 All apertures to services blocked off to prevent ingress of concrete, mortar and dirt✓			
Backup poker vibrator available and a sufficient supply of fuel			
Correct release agent used and properly applied to the formwork so that there is a thin film but no pools			
7.1.5 All form joints are grout tight and flushed✓			

(5 × 1) (5)

7.2 Curing is the process followed to delay the evaporation of moisture from concrete.✓ Keep the formwork in place.✓ Cover the concrete with plastic for seven days.✓ Keep it wet by spraying water on it to control the hardening process or to prevent frost.✓ (5)

7.3 If the formwork does not fit properly and has gaps, grout will run out and leave unfilled spaces between the stones that is left behind. (2)

7.4
- There should always be one or two persons under the formwork to check for any leaks.
- Any leaks in the formwork must be plugged immediately to prevent honeycombs.
- There are various methods to seal joints between the forms to make the grout tight.
- Duct tape or self-adhesive foam gaskets can be used to prevent leaks.
- Ensure that the grout has a long way to flow. (5)

7.5 28 days (1)

7.6 It can reduce the effective concrete cover on the reinforcement. (2)
[20]

TOTAL: 100

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