higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

MATERIALS
NQF LEVEL 3

17 November 2023

This marking guideline consists of 6 pages.

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QUESTION 1

1.1 1.1.1
- Natural defects either develop in living timber or occur immediately after felling.
- Knots, natural inclusion, and abnormal growth rings are examples of natural defects.

1.1.2 Distortion defects develop after felling✓ when cracks or a change in shape occur because timber shrinks as it dries.✓

(2 × 2) (4)

1.2 When the moisture content of timber and the humidity in the surrounding environment are the same, we say that the timber's moisture content is in equilibrium.✓ Timber maintains this equilibrium by either losing or gaining moisture.✓ (2)

1.3 Hangers and hurricane clips. (1)

1.4 1.4.1
- The strength of timber refers to its resistance to failure.
- The strength of timber is normally greater in the direction of the grains.

1.4.1 If two pieces of timber are of the same size and have the same moisture content, the heavier one will be the stronger of the two. The density of timber is its weight per cubic meter.

1.4.2 Density indicates the strength and stiffness of timber.

1.4.3
- Stiffness refers to timber's ability to resist bending or deforming when subjected to a load.
- Stiffness is measured by the modulus of elasticity. The higher the modulus of elasticity, the stiffer the timber.

(3 × 2) (6)

1.5
- Mechanical stress grading
- Visual grading

(2)
[15]

QUESTION 2

2.1
2.1.1 H
2.1.2 G
2.1.3 I
2.1.4 A
2.1.5 B
2.1.6 C
2.1.7 J
2.1.8 F
2.1.9 D
2.1.10 E

(10 × 1) (10)

2.2
- Steel is produced from iron ore, scrap metal and other additives melted together in furnaces at a very high temperature.
- The molten metal is then solidified into semi-finished shapes.
- It is then rolled, cast, drawn and extruded to produce sheets, bars, tubing, wire, rods, and beams. (3)

2.3
- Laser cutting
- Abrasive water jetting
- Plasma arc cutting
- Sawing
- Flame cutting
- Cropping
- Guillotining (Any 3 × 1) (3)

2.4
2.4.1 Forging is the process of heating✓ and then hammering metal into the desired shape.✓

2.4.2 Rolling is the process of feeding a piece of metal into a rolling machine✓ and tightening the rollers until the metal is rolled.✓

(2 × 2) (4)
[20]

QUESTION 3

3.1
3.1.1 True
3.1.2 True
3.1.3 True
3.1.4 False
3.1.5 True

(5 × 1) (5)

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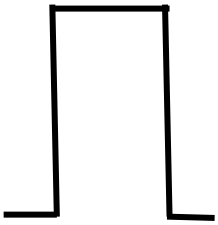
3.2
- Minimise on-site construction work and overcrowding.
- Save time and money.
- Cut the number of labourers needed on a site.
- Minimise the need for on-site formwork, shuttering and scaffolding.
- Reduce the time that labourers have to spend in bad weather. (5)

3.3 3.3.1



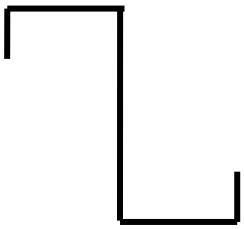
Lipped Channel

3.3.2



Top-hat section

3.3.3



Lipped Z-bar

(3 × 2) (6)

3.4
- Although steel is known to be incombustible and strong, in reality, it loses its strength when attacked by fire.
- If it absorbs thermal energy of up to 550 ºC, it will start to buckle and will lose its strength rapidly.
- Even after a fire has been extinguished, its strength will be less than before the fire.
- This may result in structural failure because its load bearing capacity will be greatly diminished because of its loss of strength. (4)

[20]

QUESTION 4

4.1 4.1.1 Electroplating
4.1.2 Insulating and encapsulating
4.1.3 Inherent corrosion resistance
4.1.4 Drainage design
4.1.5 Painting
4.1.6 Hot-dip galvanising

(6 × 1) (6)

4.2
- Check that closed vessels and hollow structures are properly vented for safety and optimal fill.
- Venting and drainage holes should be diagonally opposite each other at the highest and the lowest point of the metal as it is dipped.
- Remove all welding slag properly.
- Clean the steel surface with an abrasive blaster to remove rough material and smoothen out the steel.
- Provide clear temporary or permanent markings on the metal to guide the galvaniser. (5)

4.3 By obvious faults such as not being continuous,✓ not relatively smooth and having sharp points.✓ (2)

4.4 White rust forms when a freshly galvanised surface is unable to create a protective zinc layer✓ and the surface is moistened or completely submerged in water.✓ (2)

[15]

QUESTION 5

5.1
- Strong and tight joint is formed.
- It is cost-effective.
- Parts welded together do not have to fit exactly.
- Portable welding equipment is available.
- Various metals and alloys can be joined by welding. (5)

5.2 5.2.1 It is important to wear safety goggles during welding because flying pieces of metal when a metal is prepared for welding and when slag is chipped from a finished welding, may get into your eyes.✓ They may affect your eyesight and even cause blindness.✓

5.2.2
- A welding helmet is made of a special filter plate and has shaded lenses.
- It will protect your eyes against blinding light and flying sparks.

5.2.3
- During welding works, fumes and vapours form when metals melt.
- Inhaling such fumes are harmful to your health. Therefore, it is important to wear a respiratory mask.

(3 × 2) (6)

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5.3
- Steel can be cleaned and prepared by spraying it with chemicals such as chlorinated solvents.
- Dip the metal in an acid and wash it with warm water. (2 × 2) (4)

5.4
- I would look for a welder who is accredited with the South African institute of Welding.
- He or she should have a certificate of training in welding pressure vessels, boilers, and non-metallic materials.
- I would also contact his or her references to find out if he or she can weld safely and if his or her welding is of a high standard. (3)

5.5
- Structural welding codes set standards for welding and safety.
- They also guide welders in constructing welds and erecting welded structures. (2)

[20]

QUESTION 6

6.1
- Float glass is mostly used because it is cheap and has see-through properties. But when it breaks, its sharp pieces are dangerous.
- Broken glass results when a person falls on it or when a hard object hits it. (2)

6.2
- Laminated glass is characterised a layer of plastic between two layers of glass.
- When it breaks, laminated glass will not shatter because the plastic layer keeps the pieces together. (2)

6.3
- It is resistant to explosions such as bomb blasts.
- It is resistant to windstorms.
- It blocks noise.
- Thicker types are even bulletproof. (Any 3 × 1) (3)

6.4
- Measuring tape
- Putty knife
- Glass cutter (3)

[10]

TOTAL: 100

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