higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

MATERIALS
NQF LEVEL 3

13 November 2024

This marking guideline consists of 6 pages.

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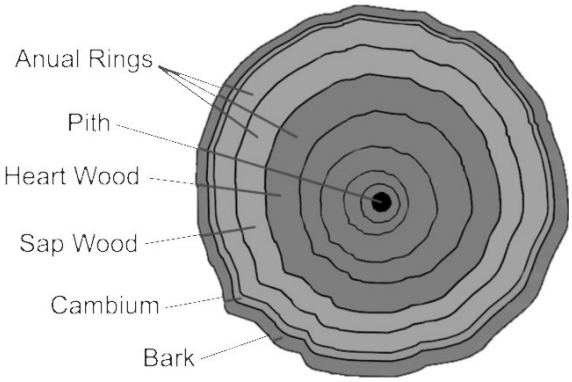
QUESTION 1

1.1 Timber is produced from tree which require large amounts of water to grow,✓ therefore due to water being a scarce resource in South Africa, it becomes difficult to reproduce timber in large quantities.✓ (2)

1.2



(ONE mark for five correctly labelled parts) (5)

1.3 Hurricane clips
Hangers

(2 × 1) (2)

1.4 Timber that failed the grading✓ and is unsuitable for structural timber application.✓ (2)

1.5
- Timber should be stacked in a dry, covered area, if possible, where won't be affected by rain or direct sunlight.
- Timber should be stacked in packs.
- Timber should be covered in plastic and laid flat on its wider side to avoid warping.
- Elevate the timber off the ground by stacking the packs on dunnage or bearers.
- The maximum height of stacks should be of the correct height.
- Ensure that columns of stacks do not lean against or support one another.

(Any 4 × 1) (4)
[15]

QUESTION 2

2.1
- Environment plays a very important role in the behaviour of materials, therefore, the weather needs to be taken in consideration.
- Metal tends to expand and contract due to temperature.
- Different materials have different coefficients of thermal expansion when heated or cooled. (3)

2.2 The ability of metal to resist plastic deformation✓ in the form of abrasive activities such as scratching.✓ (2)

2.3
- Electric arc furnace
- Integrated mills
- Finishing steel (3)

2.4 2.4.1 Cropping is a process of neatening metal edges✓ or cutting it to specified sizes using different set-ups.✓

2.4.2 A hydraulically powered machine✓ that is used when a sheet metal needs to be cut accurately.✓

2.4.3 The tool is made up of a high-pressure water pump and a fine nozzle✓ that slices into a metal using bursts of water at high velocity and pressure.✓

(3 × 2) (6)

2.5 2.5.1 Wet weather may speed up the rate of metal corrosion and very cold climates may metal to become brittle.✓ Great caution should be taken when using metal in such environments.✓

2.5.2 Physical properties determine the performance of the metal in use.✓ It is, therefore, crucial to choose a metal that suits the application.✓

2.5.3 Budget is very important in the design stage.✓ Always look at the quality of work required so that you one can choose the material best suited for the purpose.✓

(3 × 2) (6)
[20]

QUESTION 3

3.1
- Steel is easy to maintain and maintenance costs are lower.
- There is a reduced risk of fire because steel studs are non-flammable.
- Steel constructions are strong, durable, and stable.
- Steel is environmentally friendly.
- Steel never breaks, shrinks, cracks or twists in normal use. (5)

3.2 Its affordable and its carbon content and magnetic properties make it strong enough for a variety of jobs without being costly. (1)

3.3
- As the fire continues to burn, the physical properties of steel is greatly affected.
- The structure will start to buckle long before it melts, due to the amount of thermal energy absorbed.
- The steel will lose its initial strength and even if the fire is extinguished the strength will remain lower than it was design for.
- The load-bearing capacity of the steel will be greatly affected, which may result in structural failure. (4)

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3.4
- To support the structure
- Prevent buckling of the web members loaded in compression
- Share loads between adjacent members
- Transfer lateral forces to diaphragms (3)

3.5 Shims are used to level a base plate that rests on uneven ground to ensure that the base plate rests evenly. (2)

3.6
- All structural steel members need to be secured with at least two bolts that are of the size and strength indicated on the design.
- All the HD bolts should be made from the correct material and should also comply with SANS requirements.
- No bolts should protrude more than 25 mm above the nut after being tightened.
- The final coat of protective treatment should be applied before inserting the washers under the bolt when oversized holes are used.
- All the connected parts must fit together firmly and snug. (5)

[20]

QUESTION 4

4.1
- When metal is attacked by corrosion, it loses its physical properties.
- It becomes weak.
- It may cause severe structural failure.
- In severe cases it can even revert to its natural state as ore. (4)

4.2 4.2.1 Deterioration is the breaking down of a compound.

4.2.2 Corrosion is the gradual deterioration of a material due to a chemical reaction.

4.2.3 Oxidation is the reaction where a substance loses electrons.

(3 × 2) (6)

4.3
- Microbial corrosion is a type of corrosion which occurs due to bacteria, fungi and mould.✓
- It is caused when acids such as sulphur, ammonia and hydrogen sulphide✓ are used in close proximity of metals.✓ (3)

4.4 Anodising is an electrochemical process that converts the metal surface into a decorative, durable, corrosion resistance, anodic oxide finish. (2)

[15]

QUESTION 5

5.1
5.1.1 True
5.1.2 False
5.1.3 False
5.1.4 False
5.1.5 False

(5 × 1) (5)

5.2
5.2.1 Welding machine
5.2.2 Brazing torch
5.2.3 Soldering iron

(3 × 1) (3)

5.3
- The diameter of the electrode
- Moisture content of the electrode
- Travel speed
- Arc length
- Electrode angle
- Weave pattern
- Gas shield
- Temperature of the metal
- Cleanliness and preparation

(Any 6 × 1) (6)

5.4
- Clean the working surface and ensure that it is free from dirt, grease or contamination. Apply some flux over the line of the joint.
- Fire up the torch and adjust the flame so that the blue cone is in the centre.
- Slightly heat the parts to be joined using the flame.
- Hold the solder against the parts to be joined. When the temperature of the heated solder reaches melting point, it will become molten and flow into the joint. (4)

5.5
5.5.1 Gas welding
5.5.2 Friction welding

(2 × 1) (2)
[20]

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QUESTION 6

TYPE OF GLASS	PURPOSE	APPLICATION
Wired glass	Resistant to fire	Fire glass in public buildings
Glazed panels	Create glass panels with different glass types	Can be used for wall construction
Laminated glass	Safety glass	Shop fronts
Float glass	Normal glazing work	Smaller windows in domestic housing
Toughened glass	Can withstand extremely high temperatures and high resistance to impact and wind loading	Office partitioning and shower doors

[10]

TOTAL: 100

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