higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

MATERIALS
NQF LEVEL 4

12 November 2024

This marking guideline consists of 7 pages.

Copyright reserved

QUESTION 1: PLASTICS

1.1 1.1.1 A long continuous fibre, similar to string.

1.1.2 A laminated fibre that forms a dense, strong material.

1.1.3 Short fibres that are not continuous.

1.1.4 Long fibres are chopped into shorter ones and deposited randomly into mats, with their fibres lying in all directions.

(4 × 1) (4)

1.2
- It is used for pultrusion, spiral-wound pipes and pressure pipes
- For reinforcing plastic; laminating
- Reinforcing casings of power tools, architectural partitioning, car engine compartments, ceiling panels, air conditioning and in furnaces
- Reinforcing plastic and making roofing (4)

1.3
- Pipes and sewers
- Boats, sports cars and aircraft
- Wind turbine blades
- Storage tanks
- Kayaks
- Roofing
- Plant pots
- Canopies for bakkies
- Bath, jacuzzi and swimming pools
- Paint jointed with a priming liquid (Any 5 × 1) (5)

1.4 1.4.1 Photo degradation is when chemicals in materials change when the materials absorb UV light. (2)

1.4.2 Lamination is a process used to join two or more layers of material to form a composite. (2)

1.5
- Low elastic modulus
- High creep
- High coefficient of expansion
- Degradation in UV light
- Low density
- Combustibility
- Electrical insulation (Any ONE) (1)

1.6
- Natural polymer
- Synthetic polymer (2)

[20]

Copyright reserved

QUESTION 2: ELASTOMERS

2.1
- Concrete, (alkaline substances)
- Bricks
- Plaster
- Timber
- Mild steel
- Lead
- Marble
- Galvanised iron
- Brass (Any 3 × 1) (3)

2.2 2.2.1 Gun grade elastomers are suitable for use in caulking guns and is suitable for vertical joints (1)

2.2.2 Flow grade elastomers flow like water and are can fill small joints to leave a smooth surface finish; they are suitable for horizontal joint applications (1)

2.3
- Dry surface area
- Remove any contamination
- Remove all dust and debris from joint
- Paint joint with a priming liquid (3)

2.4
- Foam seal
- Hi seal (2)

[10]

QUESTION 3: ADHESIVES

3.1 3.1.1 A Liquid
3.1.2 B Chemical
3.1.3 C Polymerisation
3.1.4 D Temperature
(4 × 1) (4)

3.2
- If the surfaces are not sound and do not fit well, the adhesive will have little to stick to, as there will be gaps that the adhesive cannot fill.
- Dirt and dust will prevent the adhesive from wetting and sticking to the surface. (2)

3.3
- Latex rubber
- Solvent (2)

3.4
- Find two pieces of timber and ensure that they are clean and ready to be joined.
- Apply PVA wood glue on both pieces and spread as evenly as possible.
- Remove excessive glue while it is still wet because it difficult to clean timber once the glue has dried.
- Bond the pieces of wood and clamp them immediately to avoid air pockets from forming between the joined surfaces.
- Leave the joined article in a well-ventilated area for several hours to set properly. (5)

3.5
- As a bond for non-porous materials, such as plastic and metal.
- As a temporary adhesive when one needs to remove the glued piece later.
- The prototyping industry.
- Gluing broken ceramic objects at home.
- In forensics, to detect fingerprints at the crime scene.
- In the medical and dental industries.
- A droplet used with sawdust and baking soda as a wood-filler. (Any 2 × 1) (2)

[15]

QUESTION 4: PAINTS, WATER REPELLENTS, COATINGS AND PRESERVATIVES

4.1
- Resin/Binders – non-hazardous component which forms a film on the surface
- Solvent – keeps the paint in a liquid form until the solvent evaporates
- Pigment – Pigment – provides the colour and covering power
- Additives – include stabilisers, dryers, thickeners and preservatives
- Extenders – are solid materials that are ground up finely and mixed into paint. It make paint cheaper by extending the volume

(2)

4.2

Advantages	Disadvantages
• Lime wash represents the best of both form and function • They're beautiful and breathable, making them the perfect choice for both historic and new buildings • Unlike typical modern paints, they don't trap water and they age beautifully • Instead of turning shabby, they develop a lovely mellow patina over time • Lime-wash protects underlying lime coatings and masonry as it acts sacrificially • It also remains vapor permeable thus allowing moisture to evaporate from the building • It is inexpensive and solvent free • It is anti-bacterial, insecticidal and fire resistant • It can be beautiful and bright and can have such depth of colour that it appears to shine	• Can be impermeable • Not washable • Can easily be rubbed off walls • Not very long lasting • Cannot be applied over an existing modern coat of paint • Bond of lime wash is not durable • Difficult to match colour in different batches of lime wash • Applied incorrectly, lime wash is not appealing to the eye

(Any 2 × 2) (4)

4.3
- Bagging is a cheaper way of protecting a wall
- It does not need an artisan to execute the task
- It provides an accepted textured finish to masonry
- It provides a more weatherproof finish
- It can be applied to new as well as old brickwork
- The brickwork pattern remains visible
- It provides a wider colour choice for a brick home
- Bagging is one of the easiest finishes to achieve
- It can be applied to new or old brickwork, as well as concrete block or concrete surfaces

(Any 4 × 1) (4)

4.4 Pesticide products containing creosote as active ingredient are used to protect wood used outdoors. Ideally suited to rough woods on sheds, fences and barns, providing excellent surface water repellence and so restricts weather damage. (1)
[Source: *https://www.epa.gov/ingredients-used-pesticide*-]

4.5
- The work area must be well-ventilated during application
- Avoid using creosote near open flames
- Avoid getting creosote on your skin and wash hands well after application.
- Articles treated with creosote should not be used near animals, fish or birdlife.

(Any 3 × 1) (3)

Copyright reserved

4.6 4.6.1
- Lead-based paints
- Chromate-based paints
- Chlorine-based paints (3)

4.6.2
- Lead-based – red lead
- Chromate-based – zinc chromate
- Chlorine-based – chlorinated rubber (3)

[20]

QUESTION 5: WATERPROOFING AND DAMP-PROOFING

5.1
- Remove any waterproofing from and thoroughly clean the roof
- Place bond breakers over the joints in the concrete
- Apply primer to the dry concrete. This wets the surface and allows the torch-on to stick
- Use a blow torch to melt the bitumen onto the roof
- Ensure that all joints are overlapped and sealed with a trowel (5)

5.2
- Provides an impermeable barrier to the passage of moisture
- Resists moisture from below (rising damp)
- Resists moisture penetration from horizontal entry (3)

5.3
- Silicones
- Silanes
- Organo-silanes (2)

5.4
- Efflorescence is a powdery white salt left on masonry or concrete surfaces as it dries
- A repellent is a substance that is hydrophobic and repels water (2 × 2) (4)

5.5 On foundation walls and on the side, above and below windows frames and doors frames. (1)

[15]

QUESTION 6: BITUMEN, TAR AND ASPHALT

6.1
- Avoid use of open flames or sparks near flammable products
- Do not smoke or use cell phones within 15 m of flammable products
- Do not heat products above the recommended temperature
- Fumes must blow downwind from gas burners
- Water must not be used when fighting a fire in a bitumen tank (5)

6.2
- Sand-skeleton mixes
- Stone mastic asphalt
- Open-graded mixes
- Large aggregate mixes (Any 3 × 1) (3)

6.3 Tar can cause severe skin rash and may even cause cancer (2)

[10]

QUESTION 7: FASTENERS

7.1
- Spring washer – locking washer used to prevent nuts from loosening
- External-tooth locking washer – spiked flat washer used to lock nuts in place
- Fender washer – oversized flat washer also used to distribute the load
- Flat washer – used to distribute a flat load
- Sculpted washer – used for attractive finishes
- Square washer – used as spacer
- Finishing washer – for finishing purposes
- Timber washers –used on timber an especially in application of roof trusses
- Serrated washers – called a shake-proof washer used in applications that vibrate often
- Nord-lock washers – washer system that consists of interlocking washers that grip each other as the bolt tightened
- Load-indicating washer – work in pairs, each washer is dimples facing each other
- External-tooth lock washer – Spiked flat washer used to lock nuts in place
- Internal-tooth lock washer – Flat washer with internal spikes used to lock nuts in place
- Square washer – general use
- Ogee washer – Sculpted washer used to achieve attractive finish

(Any 2 × 2) (4)

7.2 7.2.1 Nominal tensile strength = digit before full stop × 100 MPa✓

= 5 × 100 MPa ✓

= 500 MPa ✓ (3)

7.2.2 Nominal yield strength = 8/10 × nominal yield strength✓

= 0,8 × 500 MPa✓

= 400 MPa✓ (3)

[10]

TOTAL: 100

Copyright reserved