higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

WELDING
NQF LEVEL 3

7 December 2020

This marking guideline consists of 5 pages.

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QUESTION 1

1.1 F
1.2 H
1.3 A
1.4 I
1.5 B
1.6 D
1.7 H
1.8 J
1.9 C
1.10 E

(10 × 1) **[10]**

QUESTION 2

2.1
2.1.1 False
2.1.2 True
2.1.3 True
2.1.4 False
2.1.5 True

(5 × 1) (5)

2.2
2.2.1 Type of current and coating
2.2.2 Welding position
2.2.3 Tensile strength
2.2.4 Electrode

(4 × 1) (4)

2.3
- The test object is destroyed in the process.
- It reveals the flaws inside the weld. (2)
- With the *nick bending test* the object is placed in a vice with the weld parallel to the top of the vice and struck with a hammer until it breaks.
- It helps if nicks are cut on the ends of the weld to ensure the sample breaks on the weld. (2)
- The *ductility test* involves fixing the workpiece with the weld parallel to the jaws in the vice and bending the sample 180 degrees using an even bending force.
- If cracks appear on the weld surface, it indicates a lack of ductility. (2)

2.4
- Do not drop rods or let hard objects fall on them. The coating will break off.
- Keep them dry. Moisture can cause defects when welding.
- Store in airtight container.
- Always inspect electrodes before welding. Discard damaged ones. (4)

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2.5
- The employer must provide insulated equipment which are needed when working on live electrical machinery.
- Electrical machinery which is live should be grounded to prevent electrical shock to the person using the machinery.
- Notices should be placed to warn that unauthorised persons are prohibited to handle dangerous electrical machinery.
- The welding area must be well-ventilated.
- Electrical machinery should not be used in places containing hazardous or explosive gases.
- Welding can be very noisy and noise protection should be used. (6)

[25]

QUESTION 3

3.1
3.1.1 Butt joint
3.1.2 Fillet/T-joint
3.1.3 Corner joint
3.1.4 Lap joint
3.1.5 Edge joint

(5 × 1) (5)

3.2
- Clean the work area and remove obstacles that prevent free movement.
- Cylinders should be secured tightly in the upright position.
- Remove all flammable substances from the work environment.
- Ensure that a fire extinguisher is present in the work environment.
- Ensure that the surface on which you will be welding, will not be ignited by the heat generated by the flame. (5)

3.3
- Check that the valves are non-return valves.
- They prevent gas from moving back into the hoses after it has entered the mixing chamber of the welding torch.
- This prevents a flame from moving into the hoses and thus prevents a flashback. (3)

3.4
- Oxygen cylinder
- Acetylene cylinder
- Regulators
- Flashback arrestors
- Hoses
- Check valves
- Welding torch
- Nozzle tips (Any 7 × 1) (7)

[20]

QUESTION 4

4.1
4.1.1 True
4.1.2 True
4.1.3 False
4.1.4 False
4.1.5 True
4.1.6 True
4.1.7 False
4.1.8 False
4.1.9 True
4.1.10 True

(10 × 1) (10)

4.2
- Aluminum dust can catch fire easily, especially when mixed with steel dust.
- The vapour produced while welding can be hazardous if inhaled which can cause memory loss.
- Molten aluminum can cause an explosion when mixed with water, chemical substances or contaminants.
- If the molten aluminum gets into contact with any part of the body it can cause serious burns.
- Precautions must be taken by the welder to wear eye and face protection as well as protective clothing in case the molten aluminum splashes. (5)

4.3
4.3.1
- Must not be stored in direct sunlight because cylinders are under pressure.
- Stored in an upright position and fastened to the wall.

4.3.2
- Stored in dry conditions.
- Avoid contact with water.

4.3.3
- Plastic bags can be used for storage to prevent surface contamination.
- Stored in places that are free of dust, scale, oil, grease and moisture.

4.3.4
- Very brittle due to heating and cooling during welding.
- The torch and nozzle must not be dropped or knocked against other objects.

4.3.5
- Should be loosely coiled after use
- Should be free from dust, oil, grease and scale

(5 × 2) (10)
[25]

QUESTION 5

5.1
- Do not touch the workpiece with your bare hands.
- Allow the workpiece to cool before handling.
- When handling the hot workpiece, use proper tools or insulated welding gloves. (3)

5.2
- The cables must comply with the amperage, duty cycle or indoor and outdoor use.
- It is recommended that rubber insulated cables are selected if outdoor use is expected and PVC insulation is for indoor use only. (2)

5.3
- It controls the amount of shielded gas which passes through the welding torch.
- Improper calibration of a flowmeter regulator will result in a too low or too high flow rate of shielding gas. (2)

5.4
- The electrode wire is the filler metal which creates the molten weld pool.
- It is melted by the arc which is generated when the trigger on the welding torch is pressed. (2)

5.5 $\text{Amperage} = \frac{\text{Material thickness}}{0,0254}$ ✓

$= \frac{12}{0,0254}$ ✓ ✓

$= 472,4$ A ✓

The correct amperage setting is 472 A. ✓ (5)

5.6 Check if:
- There are protective screens in place to shield others from the arc and sparks.
- The work area is free from cleaning agents that can react with the welding to form toxic gases.
- The work table is secure and properly grounded.
- There is suitable ventilation or if there is a fan to clear fumes and gases.
- The workplace is clear from any obstructions.
- There is enough light to perform the job. (6)

[20]

TOTAL: 100

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