higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

WELDING
NQF LEVEL 4

28 November 2023

This marking guideline consists of 5 pages.

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QUESTION 1

1.1

1.1.1	A
1.1.2	B
1.1.3	A
1.1.4	D
1.1.5	D
1.1.6	D
1.1.7	D
1.1.8	C
1.1.9	C
1.1.10	A

(10 × 1) (10)

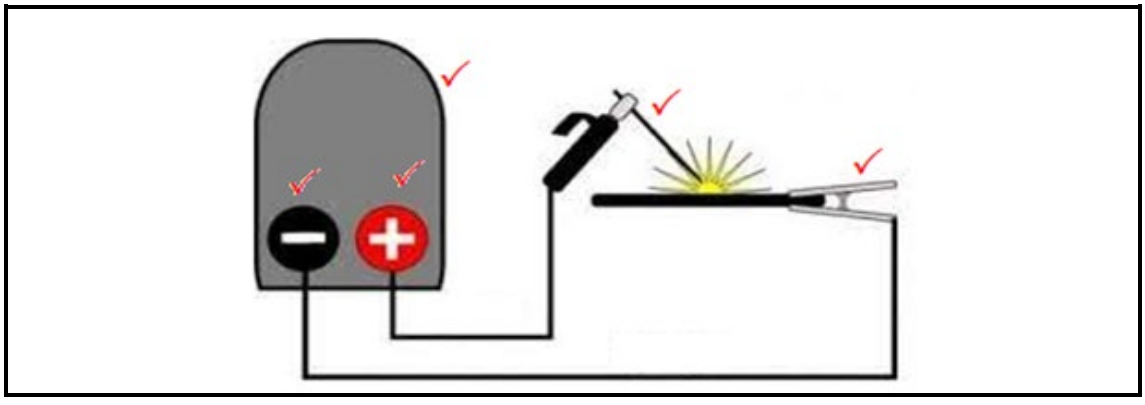
1.2
- Power supply
- Electrode
- Electrode holder
- Work clamp
- Welding cables
- Welding machine or welding inverter (Any 5 × 1) (5)

1.3
- Welding starts when an electric arc is struck between the tip of the electrode and the workpiece.✓
- The intense heat of the arc melts the tip of the electrode and the surface of the workpiece close to the arc.✓
- Tiny globules of molten metal rapidly form on the tip of the electrode✓
- and are transferred through the arc stream into the molten weld pool.✓
- The filler metal is deposited as the electrode is consumed.✓ (5)

[20]

QUESTION 2

2.1



(5)

2.2
- Thickness of the plate
- Heat input
- Weld preparation
- Joint design
- Welding position (Any 4 × 1) (4)

2.3
- The welder should not breathe in the fumes.
- In enclosed spaces there should be ventilation to remove dangerous fumes and gases.
- Respirator can be used if the ventilation is poor.
- The welder should understand the Material Safety Data Sheets (MSDS) of the chemicals and materials he or she is going to work with.
- Do not weld on coated or painted metals as these can release dangerous fumes if welded. (5)

2.4 2.4.1
- Spatter is caused by the welding current being too high.
- The arc length is too long.
- The shielding gas is insufficient. (3)

2.4.2
- To prevent excessive spatter the current must be set correctly.✓
- The arc length must be as close as possible to the workpiece.✓
- Adjust the shielding gas flow rate accordingly.✓ (3)

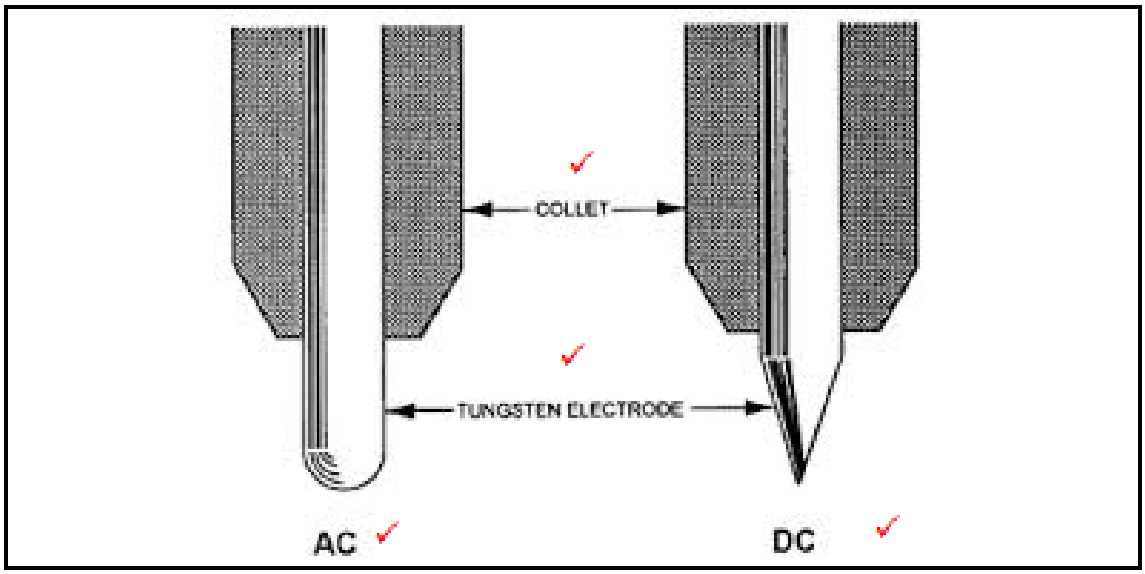
[20]

QUESTION 3

3.1
A Flowmeter
B Cylinder/Gas cylinder/Shielding gas
C Power source/Welding machine
D Remote control/Foot pedal
E Earth clamp
F Tungsten tip
G Welding torch (7)

3.2
- Amperage: The amperage should be reduced by 15%.
- Arc length: A shorter arc needs to be maintained to reduce heat.
- Work angle: Including the filler rod angle if applicable.
- Direction of travel.
- Travel angle.
- Electrode manipulation
- Travel speed (Any 5 × 1) (5)

3.3



(4)

3.4
- Operating on reverse polarity
- Incorrect electrode size for current
- Excessive heating in the nozzle
- Contaminated electrode
- Electrode oxidation

(Any 4 × 1) (4)
[20]

QUESTION 4

4.1

	ADVANTAGES	DISADVANTAGES
4.1.1	High-quality weld	Equipment is costly
4.1.2	All welding positions	High degree of skill required
4.1.3	No slag	Slower process
4.1.4	No spatter	UV rays are produced
4.1.5	Joins dissimilar metals	Cannot weld in windy conditions

(5 × 2) (10)

4.2
- Slowly open the gas cylinder valve.
- Switch on the welding power source.
- Select the current type.
- Select and prepare the correctly chosen electrode.
- Select the appropriate filler rod.
- Ensure that the base metal is clean.
- Secure the work clamp on the workpiece.

(7)

4.3
- After use, shielding gas cylinders must be closed by hand,✓
- stored in an upright position,✓
- secured with a chain and the cylinders must be stored in a cool, damp-free storeroom.✓
- Empty and full cylinders should be stored separately. ✓
- Store in an area from sources of heat. ✓

(Any 3 × 1) (3)
[20]

QUESTION 5

5.1 5.1.1 Regulator/Gas regulator
5.1.2 Welding wire
5.1.3 Flowmeter
5.1.4 Welding power source
5.1.5 Welding gun

(5 × 1) (5)

5.2
- Wire stick-out refers to the length✓
- of unmelted electrode wire✓
- sticking out from the tip of the contact tube✓
- of the welding gun and does not include the length of the arc.✓
- The stick-out wire is 7,5 mm. ✓ (5)

5.3
- The process used.
- The composition of the metal being welded.
- Welding outside or inside.
- The design of the joint.
- The cost
- The mechanical properties if the weld material. (5 × 1) (5)

5.4
- The arc voltage may be too high.
- The gas flow is too high or too low.
- Contaminated filler wire is used.
- The shielding gas may be contaminated.
- There is humidity on the workpiece. (5)

[20]

TOTAL: 100

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