higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

WELDING
NQF LEVEL 3

XX February 2020

This marking guideline consists of 5 pages.

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QUESTION 1

1.1
- Excessive hydrogen or nitrogen is trapped in the weld metal.
- Base metal or filler metal is excessively dirty.
- Improper arc length, voltage and current are being used.
- The electrode or base metal is moist.
- An incorrect welding procedure is used for the metal being welded.
- Slag becomes entrapped in the weld metal. (6)

1.2
- SMAW is versatile and adaptable to a wide variety of situations.
- SMAW is cheap to operate and maintain.
- SMAW is easy to use in confined spaces.
- SWAM equipment is simple and portable. (4)

[10]

QUESTION 2

2.1
2.1.1 True
2.1.2 False
2.1.3 True
2.1.4 True
2.1.5 False

(5 × 1) (5)

2.2 To remove all moisture from the electrode thus preventing the metal from cracking (2)

2.3
- Incorrect weld
- Scrapping of workpiece
- Loss in cost of material
- Time consuming to fix mistake (Any 3 × 1) (3)

2.4
- Prepare the workplace and equipment.
- Select the point at which to begin welding.
- Strike your arc.
- Maintain the strike in the direction of the joint to be welded.
- Once the weld is finished knock the slag off and clean the weld. (5)

2.5
- Excessive slag
- Splatter
- Irregular weld bead
- Undercutting
- Porosity
- Insufficient penetration
- Cracks (Any 3 × 1) (3)

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2.6 Ensure that the workspace is tidy and that the necessary chemicals and apparatus are ready.✓ Select a test sample.✓ Ensure that the sample is clean, smooth and rust-free before performing the test.✓ Fill an appropriate size container with the liquid penetrant fluid and put the sample inside the container for at least an hour.✓ Once soaking time is finished, remove the sample and wipe away excess penetrant.✓ Lay the sample on a few sheets of newspaper and cover it with a lot of developer powder. Shake off the excess powder back into container.✓ Move a UV light over the sample in a dim room to reveal microscopic cracks if any exist.✓ (7)

[25]

QUESTION 3

3.1
- Reduces the pressure of gas from the cylinders
- Sets the required working pressure
- Maintains constant pressure (3)

3.2 3.2.1
- Used for hard facing
- Used for welding white metal (2)

3.2.2 Used for fusion welding of steel and cast iron (1)

3.2.3 Used for braze welding with a bronze rod (1)

3.3
- Ensure that the dimensions of the parts are correct.
- Ensure that the alignment of the parts is correct.
- Ensure that the parts are free of rust, paint, grease, oil or dirt. (3)

3.4
- The workpiece must satisfy the requirement of the work-instruction sheet and the manufacturing drawing.
- The weld must be done properly.
- Check for any defects present in the weld. (3)

3.5
- Cracking
- Surface porosity
- Incomplete root penetration
- Weld undercut
- Convexity
- Concavity
- Excessive reinforcement
- Insufficient reinforcement
- Incomplete fusion (Any 5 × 1) (5)

3.6
- Daily and before each use
- Yearly by a qualified technician
- Monthly by an artisan (Any 2 × 1) (2)

[20]

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QUESTION 4

4.1
A Flowmeter regulator
B Gas cylinder
C Welding source
D Insulating sheath
E Work table
F Shielded gas
G Gas passages
H Tungsten electrode
I Welding gun

(9 × 1) (9)

4.2 4.2.1 In manual welding a welder uses a welding rod clamped to a holder to join two pieces of metal together. (2)

4.2.2 In semi-automatic welding the welder positions the electrode from a hand-held gun that feeds the electrode through the nozzle. (2)

4.2.3 In automatic welding the welder uses mechanical welding equipment with controls that do not have to be constantly adjusted. It has automatic control of arc movement along the welding line, the arc length and the electrode feed. (3)

4.3
- The gas cylinder must be turned on.
- The welding power source must be turned on.
- The current type (DC or AC) must be selected.
- A proper tungsten electrode must be selected.
- The base metal must be cleaned and prepared.
- The work clamp must be properly connected to the workpiece. (6)

4.4
- Holding the assembled components in place and ensuring it stays in the desired location
- Performing the function of a fixture and also allowing for its removal
- Preventing movement and distortion during welding
- Setting and maintaining the joint gap (Any 3 × 1) (3)

[25]

QUESTION 5

5.1
- Good setup of an MIG welding machine
- Travel angle
- Travel speed
- Contact-tip-to-work-distance (CTWD) (4)

5.2
$$\text{Amperage} = \frac{\text{material thickness}}{0{,}0254}\checkmark$$
$$= \frac{8}{0.0254}\checkmark\checkmark$$
$$= 314{,}96\text{ A}\checkmark \quad (5)$$

5.3
- Equipment will last longer.
- Equipment will operate as though it were new.
- Time will not be wasted looking for equipment.
- The workplace will be safer because tools and equipment will not be lying around.
- Planning can be conducted properly – a cluttered workplace will not allow space to properly plan work. (5)

5.4
- Better penetration
- Welding thicker materials (2)

5.5
- Visual inspection
- Ultrasonic inspection
- Electromagnetic inspection
- Radiographic inspection (4)

[20]

TOTAL: 100

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