higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

ENGINEERING FABRICATION – SHEET METAL WORK
NQF LEVEL 4

17 November 2022

This marking guideline consists of 6 pages.

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SECTION A

QUESTION 1

1.1 True
1.2 False
1.3 False
1.4 True
1.5 True

(5 × 1) **[5]**

QUESTION 2

2.1 D
2.2 E
2.3 J
2.4 F
2.5 G
2.6 B
2.7 A
2.8 C
2.9 I
2.10 H

(10 × 1) **[10]**

QUESTION 3

3.1 NC
3.2 CAD
3.3 2D
3.4 MIG
3.5 UFAD

(5 × 1) **[5]**

TOTAL SECTION A: 20

SECTION B

QUESTION 4

4.1
- Know how to operate the machine safely.
- Know how to do an emergency shutdown of the machine.
- Be authorised to use the machine.
- Fence off the work area with gates to prevent unauthorised people from entering.
- Ensure there are sensors on the floor of the work area to detect unauthorised people. (5)

4.2 4.2.1 GTAW welding torch / TIG welding torch (1)

4.2.2 A: Cap
B: Torch/Torch handle
C: Tungsten electrode
D: Nozzle (4 × 1) (4)

4.3
- Hold the torch at a right angle to the weld.
- Angle the torch at about 70-75° in the direction of travel.
- It is better to push the weld than to pull it when butt welding. (3)

4.4 A scientific way of fume extraction is by using extractor fans or generated forced ventilation. A natural way of fume extraction is by opening windows or air vents. (2)

4.5 4.5.1 Cylinders must be fastened securely to a wall or cylinder cart using chains.

4.5.2 When cylinders are exposed to too much heat, the pressure inside may rise, which can cause the cylinders to explode.

4.5.3 Cylinders can be rolled in an upright position when moved. Cylinder carts can also be used to move cylinders.

4.5.4 A welding torch can cause an arc against the cylinder wall, which can weaken or even rapture the shell of the cylinder.

4.5.5 Never do or use anything of which you are unsure.

(5 × 1) (5)
[20]

QUESTION 5

5.1 A Pittsburgh seam is usually made on rolling forming machines and is very seldom made by hand. (2)

5.2
- Write the dimensions just above the dimension lines.
- Do not repeat dimensions on a drawing unless there is a good reason for the repetition.
- The sharp point of the arrowhead must touch the extension line.
- If possible, do not use hidden detail lines for dimensioning. (4)

5.3 Schematic ductwork layouts are drawings that show the full layout and plan of all the ductwork that must be fabricated and installed. (2)

5.4
- Types of lines
- Quality of line work
- Line thickness
- Precedence or priority of lines
- Dimensions, symbols and mark numbers (Any 4 × 1) (4)

5.5 5.5.1 To protect the air-conditioner against electrical faults

5.5.2 To control the motor and protect it against overload or undervoltage

5.5.3 For servicing the unit or for emergency stopping
(3 × 1) (3)

5.6 5.6.1 The use of fans and vents to mechanically distribute ventilation and other conditioned air through a building

5.6.2 Uncontrolled flow of outdoor air into a building

5.6.3 The movement of air into and out of a building through intentional or planned routes without the assistance of mechanical equipment
(3 × 1) (3)

5.7
- Conditioned air delivered at the correct air pressure to overcome pressure drop through the air terminals
- Minimum change in air temperature through the ductwork
- Suitably attenuated plant noise and duct-generated noise (Any 2 × 1) (2)

[20]

QUESTION 6

6.1
- Time is saved due to the rate at which parts are produced.
- There is no need to increase storage space.
- It improves client service. (Any relevant 3 × 1) (3)

6.2
- The material can withstand being operated at a high speed.
- The material can withstand being operated at a high feed rate.
- The material is strong enough to cut almost all materials. (3)

6.3
- Follow the instructions in the CNC manual, on the notices on the CNC machine and on the workshop notice board.
- Always wear the correct protective clothing when entering the workshop.
- Keep the workshop neat and tidy.
- Follow the correct procedures for turning the machine on and off.
- Follow the procedures for inserting tools and installing the workpiece. (5)

6.4
- Place a workpiece with a given diameter and length in the chuck.
- Secure the workpiece securely into the chuck and get the machine read for operation.
- Start the spindle.
- Select the tool that is to be set on the machine.
- Slowly advance the tool so that it just touches the workpiece.
- Use the offset key and enter the diameter of the workpiece.
- Scratch the tip of the tool on the face of the workpiece to mark the position. (7)

6.5
- Select the correct tool for a specific job.
- Check, adjust and replace worn or damaged tooling.
- Remove the workpiece and measure it to make sure it conforms to the original specifications. (3)

6.6 6.6.1 All waste materials such as swarf should be carefully removed from the bin using hand gloves.

6.6.2 Separate waste that can be recycled, such as brass and copper, from nonrecyclable waste and follow the company procedure for recycling.

6.6.3 Follow the company procedure for recycling.

(3 × 2) (6)

6.7
- The thumb is the X-axis.
- The forefinger is the Y-axis.
- The middle finger is the Z-axis. (3)

6.8 A – Clamp
B – Clamp screw
C – Chip breaker
D – Holder
E – Tip (5 × 1) (5)

6.9
- Ensure that the cutter bodies are rigid and secure.
- Ensure that the spindle head has zero play in the bearings.
- Ensure that the machine power is adequate for the programmed feed and speed.
- Ensure that the workpiece fixture is suitable for the workpiece and that it is the quick clamp/quick release type.
- Ensure that the tool holder for both carbide and aluminium tips is rigid.

(Any relevant 5 × 1) (5)
[40]

TOTAL SECTION B: 80
GRAND TOTAL: 100

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