higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

ENGINEERING FABRICATION: BOILERMAKING
NQF LEVEL 4

28 November 2023

This marking guideline consists of 5 pages.

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SECTION A

QUESTION 1

1.1	1.1.1	Sketch	
	1.1.2	Toolpath	
	1.1.3	Software	
	1.1.4	Volume	
	1.1.5	Compress	
	1.1.6	Penetration	
	1.1.7	Pictures	
	1.1.8	Bracings	
	1.1.9	Offset	
	1.1.10	Process	
		(10 × 1)	(10)
1.2	1.2.1	C	
	1.2.2	F	
	1.2.3	A	
	1.2.4	B	
	1.2.5	D	
		(5 × 1)	(5)
			[15]

TOTAL SECTION A: 15

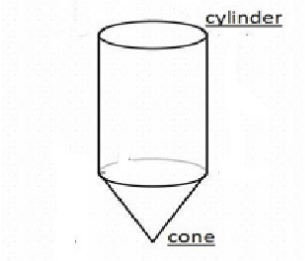
SECTION B

QUESTION 2

2.1 2.1.1 Double V-butt joint (1)

2.1.2
- V-butt joint to be welded both sides
- 1/8 gap of weld
- Groove angle of 60° (3)

2.2 2.2.1



TWO marks for cylinder, TWO marks for cone, ONE mark for correctness. (5)

2.2.2

Volume of vessel = volume of feed = $\frac{1}{3}\pi r^2 h$
Diameter = 25,2 cm, therefore radius = 12,6 cm
Height = 32 cm

Volume of feed in the vessel = $\frac{1}{3}\pi r^2 h$

$$= \frac{1}{3} \times \frac{22}{7} \times 12.6 \times 12.6 \times 32$$

$$= 5322.24 \text{ cm}^3$$ (4)

2.3 2.3.1 A test is carried out to check if the pressure vessel is operating according to the manufacturer's specifications. (2)

2.3.2
- Adjust and secure the safe maximum working pressure.
- Test the operation of the pressure vessel.
- Adjust the control points according to requirements. (3)

[18]

QUESTION 3

3.1 3.1.1 A − Isometric
B − Oblique
C – Perspective (2 × 3) (6)

3.1.2 A
- An isometric drawing has a set of parallel lines.
- An isometric drawing is much easier to draw. (Any ONE)

C
- A perspective drawing has no parallel lines.
- The perspective lines will reach the vanishing points if you continue drawing along these lines. (Any ONE)

(2 × 1) (2)

3.2 3.2.1 A pull-lift hoist (1)

3.2.2
- It can be used to lift loads up and down (vertically), across (horizontally) or at any angle.
- It can be used to pull tension cable stays and shifting loads. (2)

3.3
- Thoroughly check all equipment before use.
- Any faults must be reported and must be repaired by a qualified person before the equipment is used.
- Make sure the area below a hoist is clear before using a hoist.
- A competent person must operate a hoist. This person is also responsible for slinging the load correctly.
- Dispose of any defective hoisting equipment.
- Check the safe working load (SWL) before using any hoisting equipment.
- Proper slinging methods must be used. (7 × 1) (7)

[18]

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QUESTION 4

4.1 4.1.1 100 km to metres = 10^5 m
4.1.2 1 000 cm to millimetres = 10^4 mm
4.1.3 25 mm^2 to m^2 = 25 × 10^{-6} m^2
4.1.4 1 hectare to m^2 = 10^4 m^2
(4 × 1) (4)

4.2 4.2.1 A spirit level (1 × 2) (2)

4.2.2
- It measures how parallel/level the surface is relative to the ground.
- It measures the 45° angle in various applications. (2)

4.3 Travel ² = 178 ² + 127 ² ✓
= 31 684 mm + 16 129 mm✓✓
= $\sqrt{47813}$
Travel = 219 mm ✓ (4)

4.4
- Make sure you have the most recent revised and approved drawing.
- Check all the items on the general arrangement drawing.
- Identify all the marked-up items on the general arrangement drawing.
- Check the general arrangement drawing together with the orthographic drawings, isometric drawing, and the flow-sheet diagram.
- Get the pipework assembly and material list.
- Check the orientation of the pipework system that you need to assemble and install.
- Use the marker to mark up the final assembly drawing.
- Let us look at the types of drawings that you must be able to interpret for pipework fabrication. (Any 6 × 1) (6)

[18]

QUESTION 5

5.1 5.1.1 A program that directs the computer on how to do the job.
5.1.2 The equipment and devices that enable a computer system to work.
A set of instructions that is used for solving mathematical problems.
5.1.3
(3 × 1) (3)

5.2
- Chuck
- Cutting tool
- Tailstock
- Bed (4)

5.3 5.3.1 Point-to-point movement (1)

5.3.2
- The path is from one defined point to another defined point.
- The control guides the spindle or the workpiece to a numerically defined point. (2)

5.3.3 Continuous path movement (2)

5.4
- With the just-in-time rule a large amount of stock is no longer made ahead of time and stored.
- Components are fabricated when they are needed. (2)

5.5
- Follow all safety procedures.
- Fit the tools and install the workpiece.
- Load the computer-based programmes and key in the required activities on the control panel of the CNC machine. (3)

5.6
- Flash disc
- DVD
- Memory stick (3)

5.7 5.7.1 Carefully remove all waste material, such as swarf from the bin.be when you handle swarf, as it can be very sharp and cause severe cuts.

5.7.2 Separate waste that can be recycled such as brass and copper from non-recyclable waste and follow the company's procedure for recycling.

5.7.3 Follow the company's procedure for disposing of non-recyclable waste.

(3 × 2) (6)

5.8
- The amount of material that must be removed from the workpiece.
- The cutting speed required.
- The production rate that is required or the number of workpieces that can be produced per minute. (3)

5.9
- Micrometre
- Vernier callipers (2)

[31]

TOTAL SECTION B: 85
GRAND TOTAL: 100

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