higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

ENGINEERING FABRICATION – BOILER MAKING
NQF LEVEL 3

27 November 2023

This marking guideline consists of 6 pages.

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QUESTION 1

1.1 1.1.1 F
1.1.2 D
1.1.3 A
1.1.4 B
1.1.5 C

(5 × 1) (5)

1.2 1.2.1 vessel
1.2.2 pressure
1.2.3 scriber
1.2.4 Travel
1.2.5 compress

(5 × 1) (5)
[10]

QUESTION 2

2.1
- Joint type
- Weld preparation shape
- Weld type
- Welding process
- Specifications or procedures
- Weld location
- Extent of welding
- Quality requirements
- Weld sequencing
- Weld size
- Final weld configuration
- Production method (Any 4 × 1) (4)

2.2 Cold-formed sections are made by either rolling machines or bending machines through forging. (2)

2.3 2.3.1
- Ferrous metals contain mainly iron with small proportions of other metals.✓
- Metals that contain iron are referred to ferrous metals and corrode (rust) rapidly unless protected by grease or paint.✓
- Examples: cast iron, wrought iron, mild steel✓

(Any ONE + example)

2.3.2
- Nonferrous metals contain little or no iron.✓
- A thin layer of oxide forms on the skin of these metals protecting them from corrosion.✓
- Examples: aluminium, copper, brass, bronze

(Any ONE + example)✓
(2 × 2) (4)

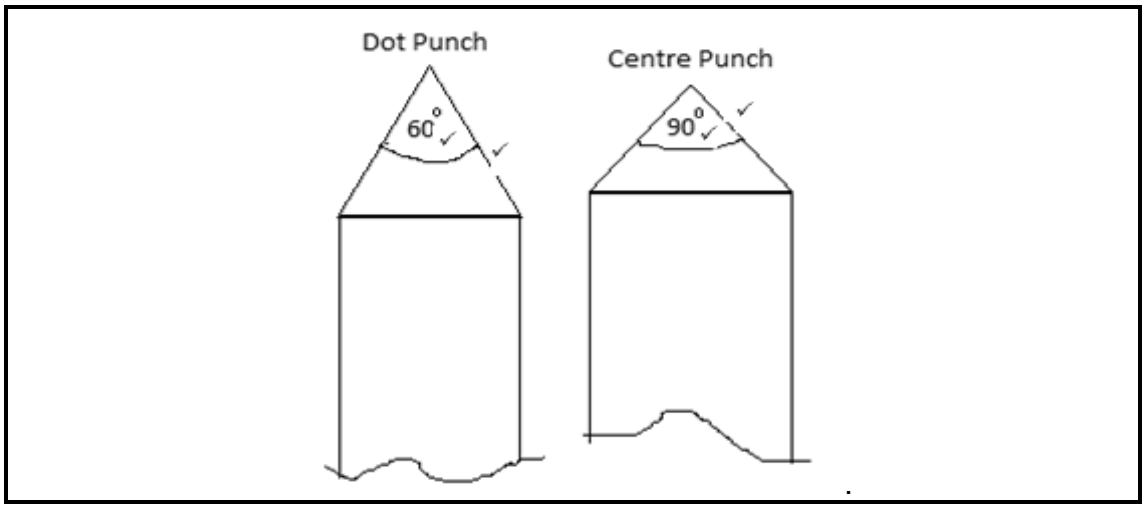
2.4 The purpose of a jig is to fix the girder or truss in place while fixing by welding or bolting. (2)

2.5 2.5.1 It is used to prepare a metal sheet or plate before marking-off.

2.5.2 It is used to establish a straight level line against a wall, structure, floor or deck.

(2 × 2) (4)

2.6



(4)
[20]

QUESTION 3

3.1
- Spatter
- Undercut
- Poor fusion
- Porosity
- Cracking (Any 4 × 1) (4)

3.2
- Decrease the current as long as it is in the recommended range.
- Shorten the arc length.
- Change the angle of the torch. (3)

3.3 Place the welded workpiece in a vice and hammer the plate towards the face of the weld. (3)

3.4 A: Power line
B: Welding power source
C: Gas flow regulator
D: Gas hose
E: Shielded gas cylinder
F: Welding wire
G: Welding torch
H: Workpiece
I: Wire feeder
J: Earth (Any 5 × 1) (5)

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3.5
- Keep leads and cables clear of passageways.
- Keep electrical equipment clear of the area where a grinder is used.
- Make sure welding equipment is installed properly and connected to earth.
- Do not stand in water when welding.
- Turn off the welder when not in use.
- Check the wire connections regularly to prevent electrical short circuits. (6)

3.6
- Blow the gas through the valve by rapidly opening and closing the valve to dislodge foreign material.
- Remove the cylinder if it can still not close properly from the workspace and take it to an open field away from buildings.
- Allow the gas to be freely opened in the atmosphere.
- Close the cylinder, take it back to storage and alert the store staff to take it back to the supplier. (4)

[25]

QUESTION 4

4.1 4.1.1 Length of plate = π × D
= π × MD
= π × (1 350 – 10)✓
= π × 1 340
= 4 209,73 mm✓
= 4,21 m✓

4.1.2 Length of flat bar = π × MD
= π × (1 350 + 20)✓
= π × 1 370
= 4 304 mm✓
= 4,304 m✓

4.1.3 Volume = Area × Height
= πr^2 × 3 m✓
= π × $0{,}665^2$ × 4,5✓
= 6 × 25 m^3✓

(3 × 3) (9)

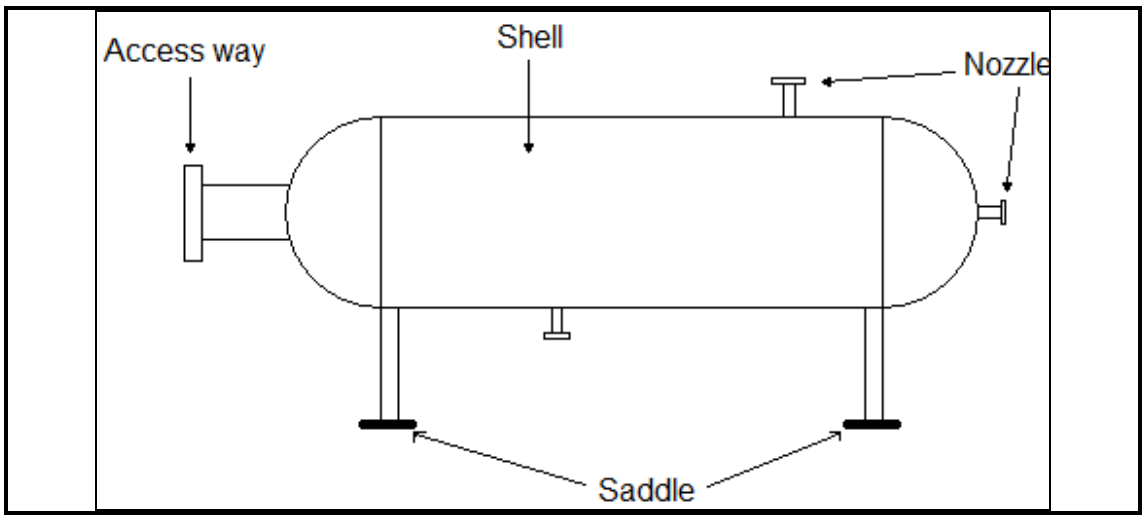
4.2
- Check that all the components are secured and ready for final welding.
- Follow all specifications and instructions in accordance with the working drawing.
- Verify that all the items are assembled in the correct order and positions.
- Mark-up all the items to correspond with the working drawing.
- Have an assistant recheck all setting-out and assemblies. (Any 3 × 1) (3)

4.3
- Overhead travelling crane
- Tower cranes
- Wharf cranes
- Mobile cranes (Any 3 × 1) (3)

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4.4 A: Inside measurements
B: Depth measurements
C: Main/Graduated scale
D: Vernier scale
E: Outside measurements (Any 3 × 1) (3)

4.5



(4)
[22]

QUESTION 5

5.1 Length of bend = π × MD✓ (full circle)
= π × (60 + 60 + 4)✓
= π × 124
= 389,6 mm✓

Total length of bracket plate = (2 × 100) + (2 × 120) + 389,6✓
= 200 + 240 + 389,6
= 829,6 mm
= 0,8296 m✓ (5)

5.2
- Triangulation line method
- Radial line method
- Parallel line method (3)

5.3
- When the plate rolls make sure the clamps are secured.
- All adjustments must be fixed and locked in place.
- All clamping tools must be in good working order.
- Only use the correct clamping tools required for the job.
- Once the shell is rolled into the diameter required loosen clamping tools. (5)

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5.4
- See that there is no oil or grease on the floor around the machine that can cause slipping.
- Observe safety procedures and signs when using the bending machine.
- Wear safety protective clothing when operating the bending machine.
- Keep hands and feet free from all moving parts of the bending brake.
- Wear safety goggles.
- Keep the work area clear from any obstruction. (Any 5 × 1) (5)

5.5 5.5.1 Pipes are fitted to the shell for either inlets or outlets of the liquid or draining out.

5.5.2 Flanges are used to connect larger pipes to the transition piece. (2 × 1) (2)

5.6 5.6.1 **NO ANSWER PROVIDED BY EXAMINER/MODERATOR**
5.6.2 **NO ANSWER PROVIDED BY EXAMINER/MODERATOR**
5.6.3 **NO ANSWER PROVIDED BY EXAMINER/MODERATOR**
(3 × 1) (3)
[23]

TOTAL: 100

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