higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

ENGINEERING FABRICATION – BOILER MAKING
NQF LEVEL 3

21 November 2024

This marking guideline consists of 7 pages.

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SECTION A

QUESTION 1

1.1 1.1.1 C
1.1.2 E
1.1.3 A
1.1.4 F
1.1.5 D

(5 × 1) (5)

1.2 1.2.1 Basic weld symbol/tail
1.2.2 GTAW
1.2.3 Permit
1.2.4 Ellipsoidal
1.2.5 Lengths

(5 × 1) (5)
[10]

TOTAL SECTION A: 10

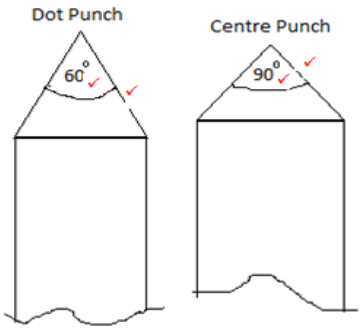
SECTION B

QUESTION 2

2.1 2.1.1 Scriber
2.1.2 Trammel points
2.1.3 Jenny callipers

(3 × 1) (3)

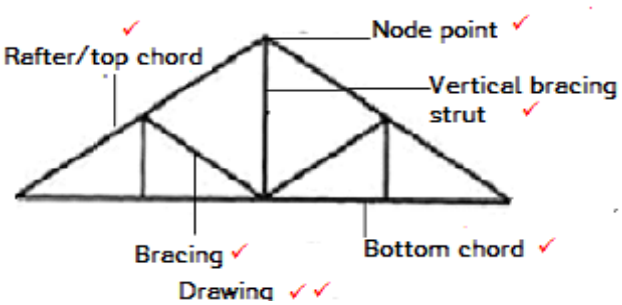
2.2



(2 marks for each punch) (2 × 2) (4)

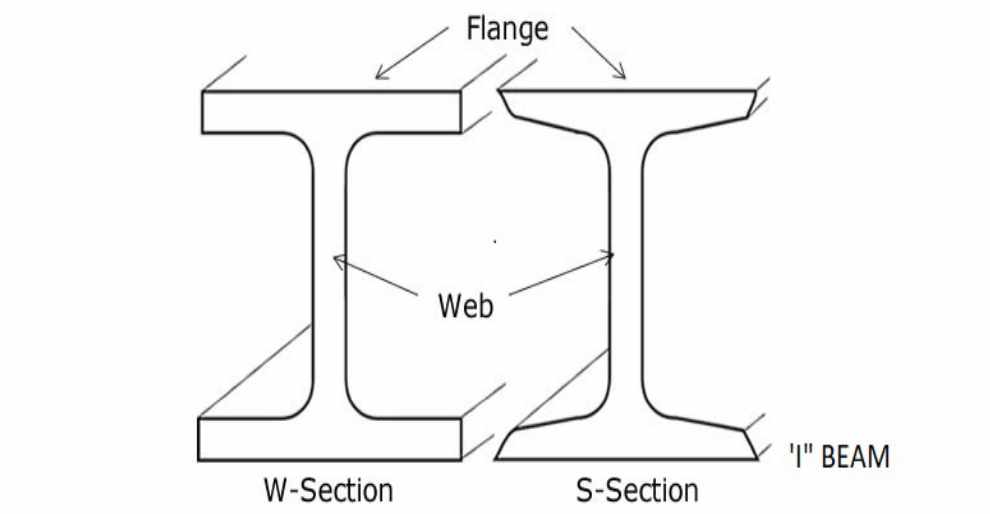
2.3 A jig is a piece of equipment used to fix or hold down a work piece.✓✓ (2)

2.4



(Any three correct answers) (Any 3 × 1) (3)

2.5



(2 × 2) (4)

2.6
- It gives specifications and prescribes welding techniques and procedures in accordance with the applicable welding codes.
- A quality control (QC) plan will be drawn up by an approved and registered quality inspector.
- All requirements and specifications are checked against a QC plan.
- A QC plan must be signed off and dated. (4)

[20]

QUESTION 3

3.1
- Riveting
- Bolting (2)

3.2 3.2.1 Outside measurements. Lower jaws.
3.2.2 Inside measurements. Upper jaws.

(2 × 1) (2)

3.3
- Set the machine to approximately the right feed setting for the thickness of the metal.
- Start welding.
- While welding, alter the wire speed knob until a good weld is obtained. (3)

3.4
- Decrease the current if it is in the recommended range.
- Shorten the arc length.
- Change the angle of the torch. (3)

3.5
A Solidified weld metal
B Molten weld metal
C Shielding gas
D Nozzle
E Electrode/feed wire

(5 × 1) (5)

3.6
3.6.1 No shielding gas: replace gas cylinder or gas pipes.
3.6.2 No feeding of electrodes: replace torch or fuse.
3.6.3 Electrode wire bends: change the liner or reset rollers.

(3 × 1) (3)

3.7
- Wear protective clothing.
- Make sure that the ventilation is adequate.
- Clean all surfaces thoroughly.
- Use the prescribed amounts for each layer.
- Use the correct tools and equipment.
- Clean up after the surface coating has been applied.
- Clean all used equipment and tools.

(Any five correct answers above) (Any 5 × 1) (5)

3.8 Chill: a metal block placed close to the weld line.✓
Function: It allows the heat to dissipate quickly during welding and minimises distortion.✓✓ (3)

3.9
- Tack-weld as many pieces together as possible before running any continued weld.
- Join the metal plates with as little welding as possible.
- Skip-weld around the work piece. In other words, make short welds at different parts of the job so that heat is distributed evenly.
- Clamp and reinforce a work piece before welding. (4)

[30]

QUESTION 4

4.1 4.1.1 Saddle
4.1.2 Access way
4.1.3 Nozzle
4.1.4 Shell

(4 × 1) (4)

4.2 4.2.1 Length of flat bar = π X MD
= π X (1620 + 12)✓
= π X 1632
= 5127.08 mm✓
= 5.127 m✓ (3)

4.2.2 Volume = Area X Height
X 3 m
= π (810 – 12)² X 3✓
= π X 0.798² X 3✓
= 6.002 ✓ (3)

4.3
- Overhead travelling cranes
- Tower cranes
- Wharf cranes
- Mobile cranes (4)

4.4
- 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.
- Use only the correct clamping tools required for the job.
- Once the shell has been rolled into the required diameter, loosen the clamping tools.

(Any 4 × 1) (4)

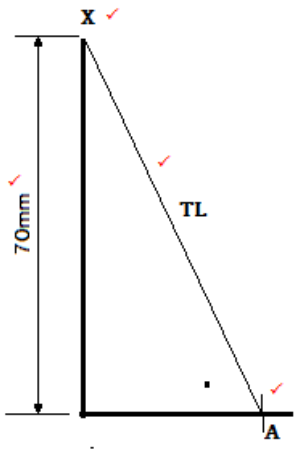
4.5
- Make sure that the latest approved working drawings are available.
- Check all sizes and measurements
- Verify that all tank and fabrication details and specifications have been followed.
- Check each weld specification and code procedure.
- Make sure that all welds have been signed off.
- All joints and seams must be tested. (Any 5 × 1) (5)

4.6
- The pressure of the tank.
- The capacity of the content. (2)

[25]

QUESTION 5

5.1



(4)

5.2

Mild Steel	Stainless steel
High carbon content	Low carbon content
Corrodes easily	Less corrosion depending on the carbon content
Highly malleable	Not easy to bend
Cheap	Expensive

(Any three correct answers) (Any 3 × 1) (3)

5.3 A measuring tape is sometimes inaccurate because it tends to sag when it is not held straight between two points.✓✓ (2)

5.4
- Mark out the template and cut it to size while making provision for a seam.
- Lay out the transition piece template and cut it out.
- Bend the 5-mm edge for the groove seam if needed.
- Check all sizes and dimensions.
- The transition piece is ready for bending. (5 × 1) (5)

5.5
- Clean all areas to be tack-welded.
- Select the correct electrode for the tack welding.
- Make sure that all fittings are set up correctly before you start to tack-weld.
- Frequently check for the squareness of the item.
- Use recommended distances between the tack welds. (5 × 1) (5)

5.6
- Supervising the overall job.
- Planning of the job before marking-off takes place.
- Checking that all documentation is in place.
- Checking all safety requirements.
- Making sure that all job instructions are carried out.
- Reporting any incorrect information pertaining to the marking out
- Recording and checking progress.
- Checking that the material and tools for the job are supplied.

(Any 6 × 1) (6)
[25]

TOTAL SECTION B: 90
GRAND TOTAL: 100

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