higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

ENGINEERING FABRICATION - BOILERMAKING
NQF LEVEL 3

16 November 2022

This marking guideline consists of 7 pages.

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QUESTION 1

1.1 F
1.2 E
1.3 A
1.4 G
1.5 D
1.6 J
1.7 I
1.8 C
1.9 B
1.10 H

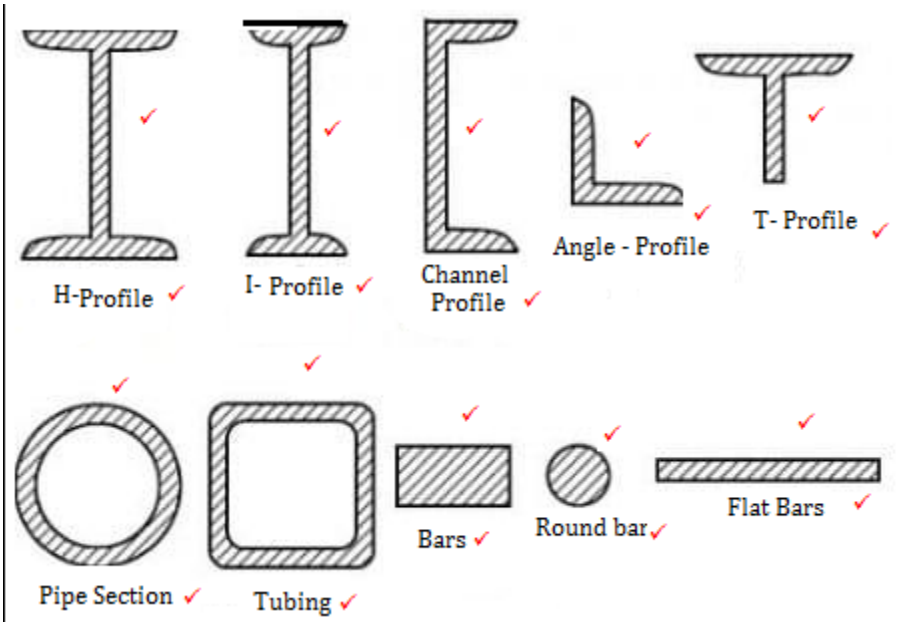
(10 × 1) **[10]**

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 3 × 1) (3)

2.2



(Any 4 × 1) (4)

2.3 Datum points are levels or positions serving as reference points when setting out a structural steel building. (2)

2.4
- Head 1 – the square head is used to mark or check that angles are at 45° and as a spirit level
- Head 2 – the protractor head is used to check or mark angles and has a spirit level
- Head 3 – the centre hook is used to locate the centre of round bars or shafts (3)

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

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

[18]

QUESTION 3

3.1 3.1.1 Treat every cut immediately, no matter how the minor it may be.

3.1.2 Remove all burrs from the metal sheet before attempting further work on it.

3.1.3 Use a brush to clean the work area. Never brush metal with your hands.

3.1.4 Ask for help when cutting large pieces of structural steel sections.

(4 × 1) (4)

3.2
- What must be done
- Where it must be done
- When it must be done
- How many items must be produced
- How many people are needed
- How much time is allocated for the job
- The equipment that has to be worked on
- The condition of the equipment
- The repairs you may have done
- Any time lost for any reason (Any 4 × 1) (4)

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3.3 A – Weld bead
B – Metal droplets
C – Solid wire electrode
D – Nozzle
E – Welding gun
F – Shielded gas
G – Electric arc
H – Grounded workpiece
I – Molten pool (Any answers 6 × 1) (6)

3.4
- Spatter
- Undercut
- Poor fusion
- Porosity
- Cracking (Any 2 × 1) (2)

3.5
- Decrease the current, as long as it is in the recommended range.
- Shorten the arc length.
- Change the angle of the torch. (Any 2 × 1) (2)

3.6 3.6.1 Adjust settings

3.6.2 Replace gas cylinder, replace pipes

3.6.3 Replace torch, replace fuse

3.6.4 Change the liner, reset rollers

(4 × 1) (4)

3.7 3.7.1 Grinder with a fine flapping disc

3.7.2 Wire brush, grinder with a fine flapping disc or fine sanding paper

3.7.3 Degreasing fluid

3.7.4 Wire brush

(4 × 1) (4)

[26]

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QUESTION 4

4.1 4.1.1 The difference between the maximum and the minimum sizes allowed when manufacturing the fabricated product

4.1.2 Need to allow for the thickness of the material when performing a bending operation

(2 × 1) (2)

4.2
- Supervising the overall job
- Planning the job before marking off takes place
- Checking that all documentation is in place
- Communicating with the other departments
- Checking all safety requirements
- Ensuring that all job instructions are carried out
- Checking that the material and tools are supplied for the job
- Reporting any incorrect information pertaining to the marking out
- Recording and checking on progress (Any 4 × 1) (4)

4.3
- Overhead cranes
- Tower cranes
- Wharf cranes
- Mobile cranes (Any 2 × 1) (2)

4.4
- Hoist
- Cross travel
- Long travel

(3 × 1) (3)

4.5 4.5.1 Length of plate = π × D (3)
= π × MD✓
= π × (1 200 – 16)✓
= π × 1 184
= 3,720 mm
= 3,720 m✓

4.5.2 Length of flat bar = π × MD✓
= π × (1 200 + 20)✓
= π × 1220
= 3 833 mm
= 3 833 m✓ (3)

4.5.3 Area of plate = L × B✓
= 3,720 m × 5 m✓
= 18,6 m^2✓ (3)

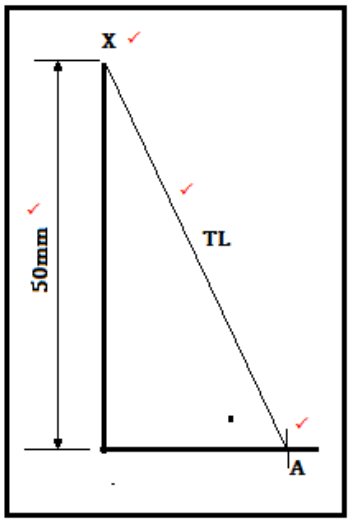
4.5.4 Volume = area × height✓
$= \pi r^2$ × 3m
= π × $0{,}584^2$ ×5✓
= 5,357 m^3✓ (3)
[23]

QUESTION 5

5.1 Length of bend = π × $\frac{D}{4}$✓ (quarter circle)
= π × $\frac{110}{4}$✓
= π × 27,5
= 86,394 mm✓

Total length of bracket plate = 200 + 125 + 86,394✓
= 411,394 mm✓
= 0,411 m✓ (6)

5.2



(4)

5.3
- Always use safety goggles and face masks.
- Wear earmuffs.
- Wear an apron, as the sparks can set overalls alight.
- Switch off the machine before putting it down.
- See that there is no oil or grease on the floor or around the machine.
- Always clamp workpieces and holding devices safely and firmly.
- Make sure that all safety machine guards are in place before starting up.
- Observe safety procedures and signs when using cutting equipment and tools.
- Carry out regular maintenance checks and record your findings.
- Keep the work area tidy at all times. (Any 6 × 1) (6)

5.4 5.4.1 To hold the sheet in position

5.4.2 To make the bending operation easier

5.4.3 To form any desired angle

5.4.4 To operate a bending leaf

(4 × 1) (4)

5.5
- Poor welding penetration and sealing
- Undercuts
- Welding slack
- Pit holds
- Porosity
- Slag inclusion
- Incomplete fusion
- Cracks

(Any 3 × 1) (3)
[23]

TOTAL: 100

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