



# higher education & training

Department:  
Higher Education and Training  
**REPUBLIC OF SOUTH AFRICA**

## **MARKING GUIDELINE**

**NATIONAL CERTIFICATE**

**APRIL EXAMINATION**

**METAL WORKER'S THEORY N1**

**2 APRIL 2013**

**This marking guideline consists of 8 pages.**

**QUESTION 1**

- |     |                  |         |     |
|-----|------------------|---------|-----|
| 1.1 | Unsafe condition |         |     |
| 1.2 | Unsafe condition |         |     |
| 1.3 | Unsafe action    |         |     |
| 1.4 | Unsafe condition |         |     |
| 1.5 | Unsafe action    |         |     |
|     |                  | (5 × 1) | [5] |

**QUESTION 2**

- |     |       |   |         |      |
|-----|-------|---|---------|------|
| 2.1 | 2.1.1 | Prick punch   |         |      |
|     | 2.1.2 | Centre punch  |         |      |
|     | 2.1.3 | Sleeve punch  | (3 × 1) | (3)  |
| 2.2 | 2.2.1 | Cast  |         |      |
|     | 2.2.2 | Hickory or a well-seasoned, straight-grained ash wood                         | (2 × 1) | (2)  |
| 2.3 |       | It is the angle that the chisel is to be held in relation to the work.        |         | (2)  |
| 2.4 | 2.4.1 | It is used to scribe a permanent mark or groove onto mild steel or sections.  |         |      |
|     | 2.4.2 | It is used to determine the size of round steel sections.                     |         |      |
|     | 2.4.3 | It is used to check the accuracy of small jobs and for marking angles, beams. |         |      |
|     | 2.4.4 | It is used to scribe arcs or radius larger than 400 mm.                       |         |      |
|     | 2.4.5 | It is used to mark off bevels or mitres on steel sections.                    | (5 × 1) | (5)  |
| 2.5 |       | $R^2 = V^2 + H^2$   | (0, 5)  |      |
|     |       | $= (120 \text{ mm})^2 + (185 \text{ mm})^2$                                   | (0, 5)  |      |
|     |       | $= 14400 \text{ mm}^2 + 34225 \text{ mm}^2$                                   | (0, 5)  |      |
|     |       | $= \sqrt{48625 \text{ mm}^2}$   | (0, 5)  |      |
|     |       | $= 220, 51 \text{ mm}$  |         | (3)  |
|     |       |   |         | [15] |

**QUESTION 3**

- 3.1 See ADDENDUM A (2)
- 3.2  $C = 3,142 \times 34 \text{ mm}$  (1)  
 $= 106 \text{ mm}$  (1)
- 3.3 See the diagram (2)
- 3.4 See the sketch (4)
- [10]**

**QUESTION 4**

- 4.1 4.1.1 It refers to the ability of the metal to return to its original shape after it has been stretched. (1)
- 4.1.2 It is the property of a metal which allows it to be drawn out into wire. (1)
- 4.1.3 It is the property of the metal which allows it to be stretched or hammered into shape without being fractured. (1)
- 4.2 4.2.1 Mild steel has carbon content between 0, 1% and 0, 3%. (1)
- 4.2.2 Malleable  
 Ductile  
 Fusible  
 Tough. (Any 2 × 1) (2)
- 4.2.3 It is used for general forging work  
 Pressing of motor panels  
 Extensively used for structural steelwork in the form of steel sections  
 Bolts  
 Nuts (Any 2 × 1) (2)
- 4.3 4.3.1 Drawing (1)
- 4.3.2 Revolutions per minute (1)
- 4.4 Back mark =  $50 \text{ mm} + 6 = 56 \text{ mm} \div 2$  (0, 5)  
 $= 28 \text{ mm}$  (2)
- [12]**

**QUESTION 5**

5.1 Pedestal drilling machine:

- Wear goggles
- Adjust the machine to the correct working speed
- Clamp the workpiece properly
- Use the coolant during the drilling process
- Use a wooden stick to remove the drill shavings from the drill bits
- One person at a time to operate the machine

(Any 5 × 1) (5)

5.2 Horizontal bending rolls:

- Do not overload the machine.
- The steel profile to be bent must be free from any oil or grease.
- Ensure that the rolls are clean and free from grease or oil.
- Check that the plate or bar to be rolled is securely held or supported.
- Ensure that the area around the rolling machine is clear.
- Avoid fingers from getting trapped into the rollers.
- Avoid wearing any loose or hanging clothing.

(Any 5 × 1) (5)  
[10]**QUESTION 6**

- 6.1 6.1.1 See the sketch (2)
- 6.1.2 See the sketch (1)
- 6.1.3 It is the distance measured from the edge to the centre point of the rivet. (1)
- 6.1.4 It is the distance measured from the centre to the next centre point of the rivet. (1)
- 6.2  $L = 1,5 \times \text{bolt diameter} + \text{thickness of material} + 3 \text{ mm for every } 12 \text{ mm thickness of material used.}$  (0, 5) (1)
- $= 1,5 \times 25 \text{ mm} + 2 \times 18 \text{ mm} + 9 \text{ mm}$  (1)
- $= 37,5 \text{ mm} + 36 \text{ mm} + 9 \text{ mm}$  (0, 5) (1)
- $= 82,5 \text{ mm}$  (1)
- 6.3 It is used where the bolt head is set flush or be in line with the metal and also where excessive vibration occurs. (2)  
[10]

**QUESTION 7**

- |     |       |   |             |             |
|-----|-------|---|-------------|-------------|
| 7.1 | 7.1.1 | Gas bottles   |             |             |
|     | 7.1.2 | Pressure regulators   |             |             |
|     | 7.1.3 | Flash back arresters  |             |             |
|     | 7.1.4 | Welding hose  |             |             |
|     | 7.1.5 | Welding torch   | (5 × 1)     | (5)         |
| 7.2 | 7.2.1 | It determines the pressure inside the cylinder and the working pressure in the hoses. |             | (2)         |
| 7.3 |       | See the sketch  |             | (2)         |
| 7.4 | 7.4.1 | Holding the welding torch too close to the workpiece.                                 |             |             |
|     | 7.4.2 | Overheated nozzle.  |             |             |
|     | 7.4.3 | Incorrect gas setting.  |             |             |
|     | 7.4.4 | Empty gas bottles.  |             |             |
|     | 7.4.5 | Dirty nozzle.   | (Any 4 × 1) | (4)         |
| 7.5 |       | The flame is extinguished by first closing the LP-gas and then the oxygen gas.        |             | (2)         |
|     |       |   |             | <b>[15]</b> |

**QUESTION 8**

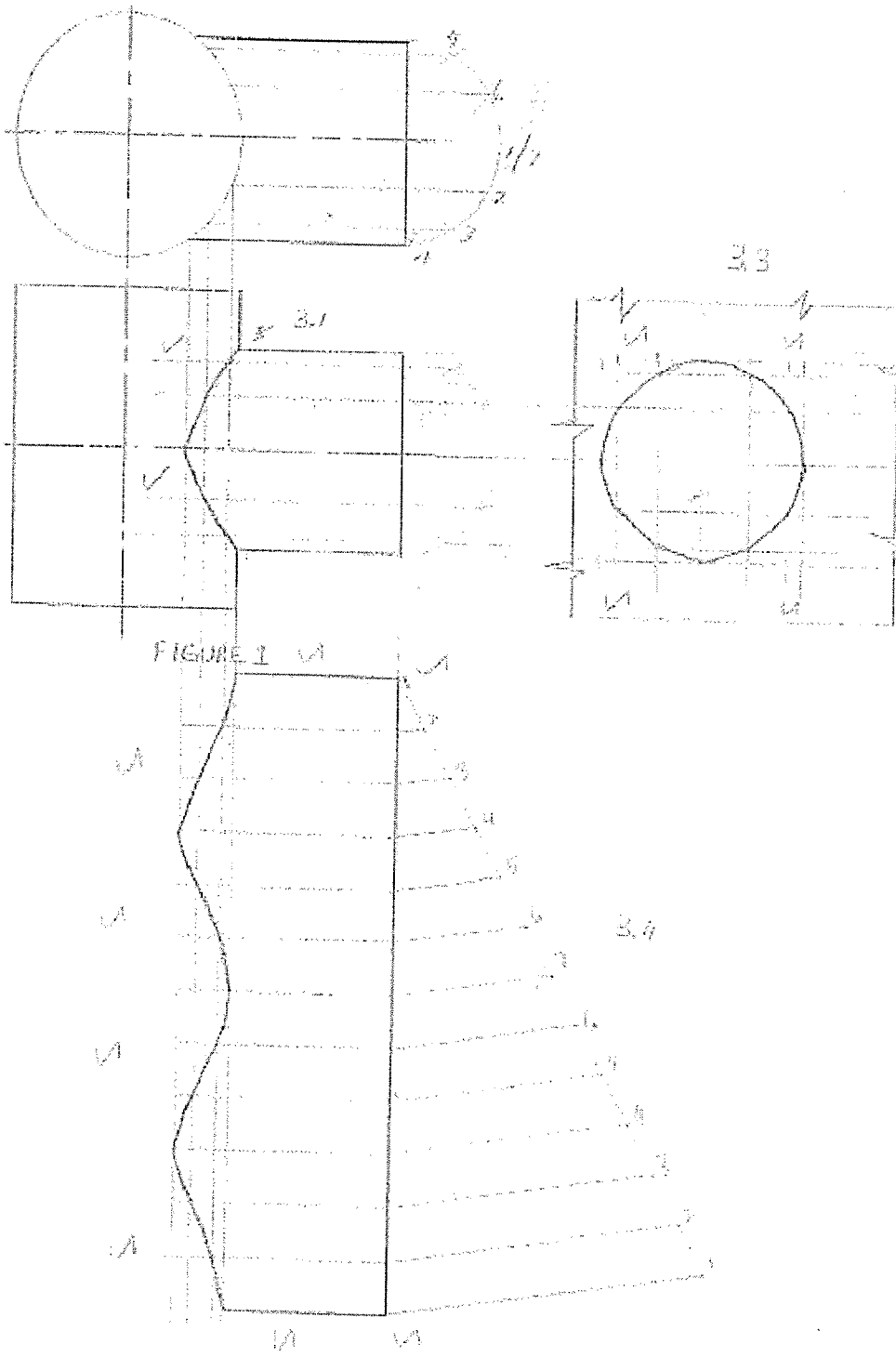
- |     |       |   |             |     |
|-----|-------|---|-------------|-----|
| 8.1 | 8.1.1 | Leather apron protects the body against ultra-violet rays and arc rays.           |             |     |
|     | 8.1.2 | Overalls for body protection.   |             |     |
|     | 8.1.3 | Safety boots protect the feet against heavy falling objects                       |             |     |
|     | 8.1.4 | Leather spats for feet protection.  |             |     |
|     | 8.1.5 | Leather gloves are used for hands protection.                                     |             |     |
|     | 8.1.6 | Leather yoke protects the back and shoulders from sparks and hot globular metals. | (Any 5 × 1) | (5) |

- 8.2 8.2.1 The transformer is approximately 50% cheaper to purchase than an equivalent generator.
- 8.2.2 The transformer is more economical to operate.
- 8.2.3 It is more efficient than the generator.
- 8.2.4 It has no rotating parts and few if any moving parts to wear out.
- 8.2.5 It does not produce any appreciable noise when welding is being done.
- 8.2.6 Arc-blow does not occur when welding with a transformer.  
(Any 4 × 1) (4)
- 8.3 8.3.1 TIG welding plant consists of a transformer, an inert gas such as Argon and the tungsten electrode and the filler rod. (2)
- 8.3.2 Earthing is when the earth clamp is mounted onto the metal being welded to complete the welding cycle and to avoid any electric shock. (2)
- 8.4 8.4.1 It is used to clean and prepare the joint before welding work is done. (1)
- 8.4.2 It is used to chip the slag from the completed weld. (1)
- [15]**

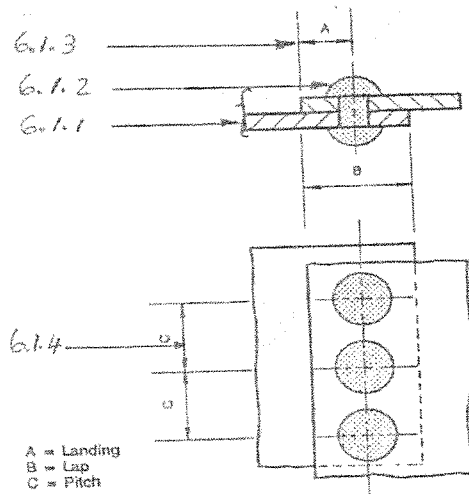
**QUESTION 9**

- 9.1 9.1.1 The cylinder:  
Mean diameter: (1)  
= 864 mm + 5 mm + 5 mm (1)  
= 874 mm (1)  
Circumference  
= 3,142 x 874 mm (1)  
= 2746, 11 mm (1)
- 9.1.2 The external stiffening ring:  
Mean diameter: (0, 5)  
= 864 mm + 10 mm + 10 mm (0, 5)  
= 884 mm + 12 mm (0, 5)  
= 896 mm (1)  
Circumference  
= 3,142 x 896 mm (1)  
= 2815, 23 mm (1)
- [8]**

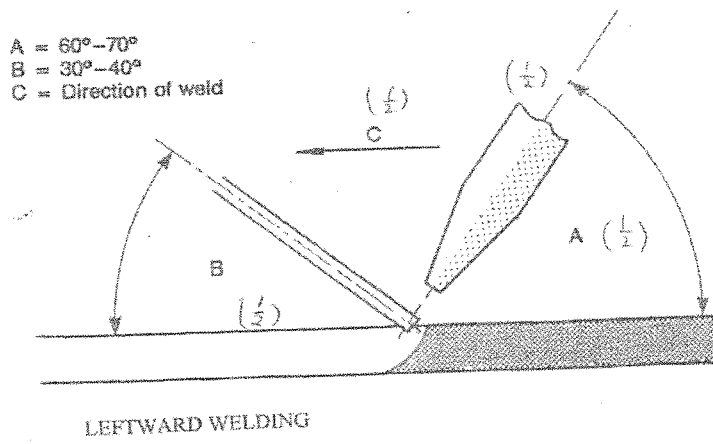
ADDENDUM A



SKETCHES



6.1



7.3

TOTAL OF SKETCHES: 40  
GRAND TOTAL: 100