higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

ENGINEERING FABRICATION - BOILERMAKING
NQF LEVEL 3

7 December 2020

This marking guideline consists of 7 pages.

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SECTION A

QUESTION 1

1.1	1.1.1	D		
	1.1.2	C		
	1.1.3	D		
	1.1.4	A		
	1.1.5	C		
			(5 × 1)	(5)
1.2	1.2.1	Arrow/Tail		
	1.2.2	Spool		
	1.2.3	Plasma		
	1.2.4	Strength		
	1.2.5	True length		
			(5 × 1)	(5)
1.3	1.3.1	B		
	1.3.2	D		
	1.3.3	A		
	1.3.4	C		
	1.3.5	E		
			(5 × 1)	(5)
1.4	1.4.1	True		
	1.4.2	True		
	1.4.3	True		
	1.4.4	False		
	1.4.5	True		
			(5 × 1)	(5)
1.5	1.5.1	Spaced		
	1.5.2	Arcs		
	1.5.3	Flowmeter		
	1.5.4	Exceed the maximum load limit		
	1.5.5	Thickness		
			(5 × 1)	(5)
1.6	1.6.1	Setting-out		
	1.6.2	Fillet weld		
	1.6.3	Material thickness		
	1.6.4	Hoisting		
	1.6.5	Not necessary		
			(5 × 1)	(5)
				[30]

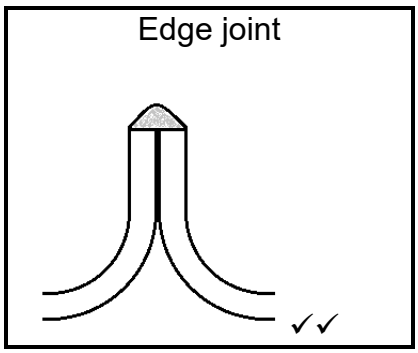
TOTAL SECTION A: 30

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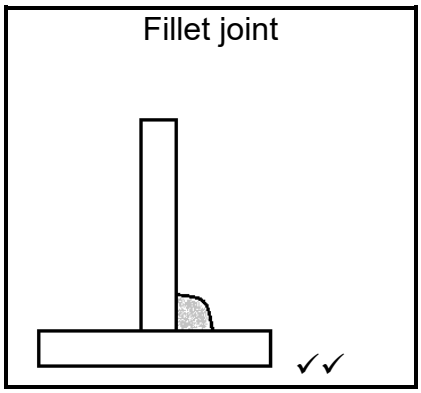
SECTION B

QUESTION 2

2.1 2.1.1



2.1.2



(Any acceptable drawings) (2 × 2) (4)

2.2 $a^2 = b^2 + c^2$ ✓
$a = \sqrt{(b^2 + c^2)}$ ✓
$a = \sqrt{(3{,}000^2 + 4{,}000^2)}$ ✓
$a = 5{,}000$ m ✓ (4 × 1) (4)

2.3
- A measurement is being taken on a ruler
- by means of Jenny callipers or odd-leg callipers. (2 × 1) (2)

2.4
- The centre of a round object is determined
- by means of the centre-head part of a combination set. (2 × 1) (2)

[12]

QUESTION 3

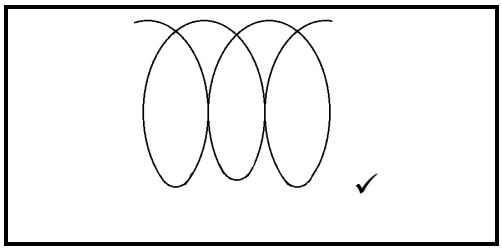
3.1 3.1.1 Feed control
3.1.2 Reel
3.1.3 Voltage control

(3 × 1) (3)

3.2
- 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 correct speed is obtained.

(3 × 1) (3)

3.3



(Any acceptable drawing) (1)

3.4 3.4.1 Push technique
3.4.2
- Pull technique
- Drag technique (Any ONE)

(2 × 1) (2)

3.5 The speed of the wire feed (1)

3.6 3.6.1
- No slag due to no flux used.
- Use of inert gas more effective than ordinary shielding methods.
- Used in any position.
- Used to weld any material.
- Weld results are stronger, more corrosion-resistant and more ductile.
- It produces no spatter, little smoke, no fumes and a clean puddle that is easily observed. (Any 2 × 1) (2)

3.6.2
- System not easily portable
- Slow welding speeds
- Not suitable for thick metal sections
- Electrode easily contaminated (Any 2 × 1) (2)

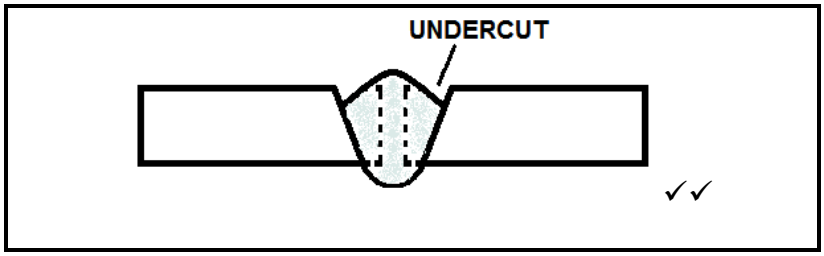
3.7 3.7.1

- All positions capable
- Higher deposit rates
- Less skill required
- Long welds can be made
- Minimal post-weld cleaning
- One-hand operation
- Easily mastered
- Low cost
- Reduce corrosion
- Reduction in metal fatigue (Any 2 × 1) (2)

3.7.2

- Irregular wire feed
- Porosity
- Unstable arc
- Difficult arc starting
- Burnback
- Metal hardening
- Poor appearance
- Cannot weld when there is wind (Any 2 × 1) (2)

3.8



(Any acceptable drawing) (2 × 1) (2)

3.9

- Torch switch broken
- Input fuse broken (Any 1 × 1) (1)

3.10 Earth wire (Colour coding is not acceptable.) (1)

[22]

QUESTION 4

4.1 A = ½b × h ✓
A = (½ × 0,688) × 1, 3 ✓
A = 0,447 m^2✓ (3 × 1) (3)

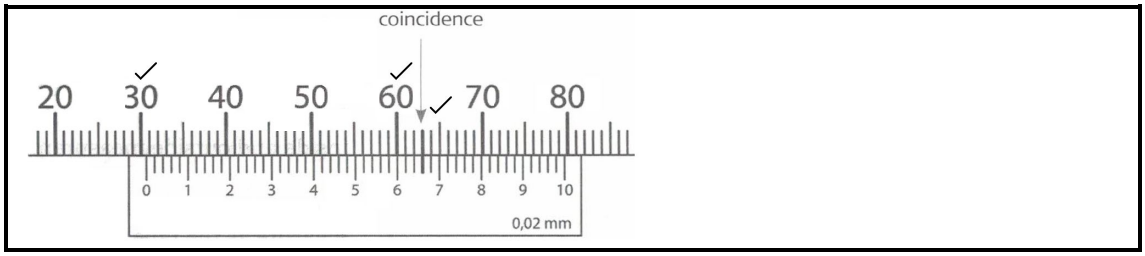
4.2 D_{mean} = OD − Mt ✓
= 2,1 − 0,012 ✓
= 2,088 m ✓

$Circ_{mean}$ = π × D_{mean} ✓
= π × 2,088 ✓
= 6,560 m ✓

Area = $Circ_{mean}$ × h ✓
= 6,560 × 1,2 ✓
= 7,872 m^2✓

(3 × 3) (9)

4.3



30,66 mm (1 mark – 30 mm; 1 mark – 0,6 mm; 1 mark – 0,06 mm) (3)

4.4 Derricking jib up (*Hoist the load* not acceptable.) (1)

4.5
- Open top
- Floating top
- Conical top
- Elliptical top

(Any 2 × 1) (2)
[18]

QUESTION 5

5.1 Length of curved corners:

R_{mean} = RI + (0, 5 × Mt)✓
= 90 + (0, 5 × 10)✓
= 90 + 5
= 95,000 mm✓

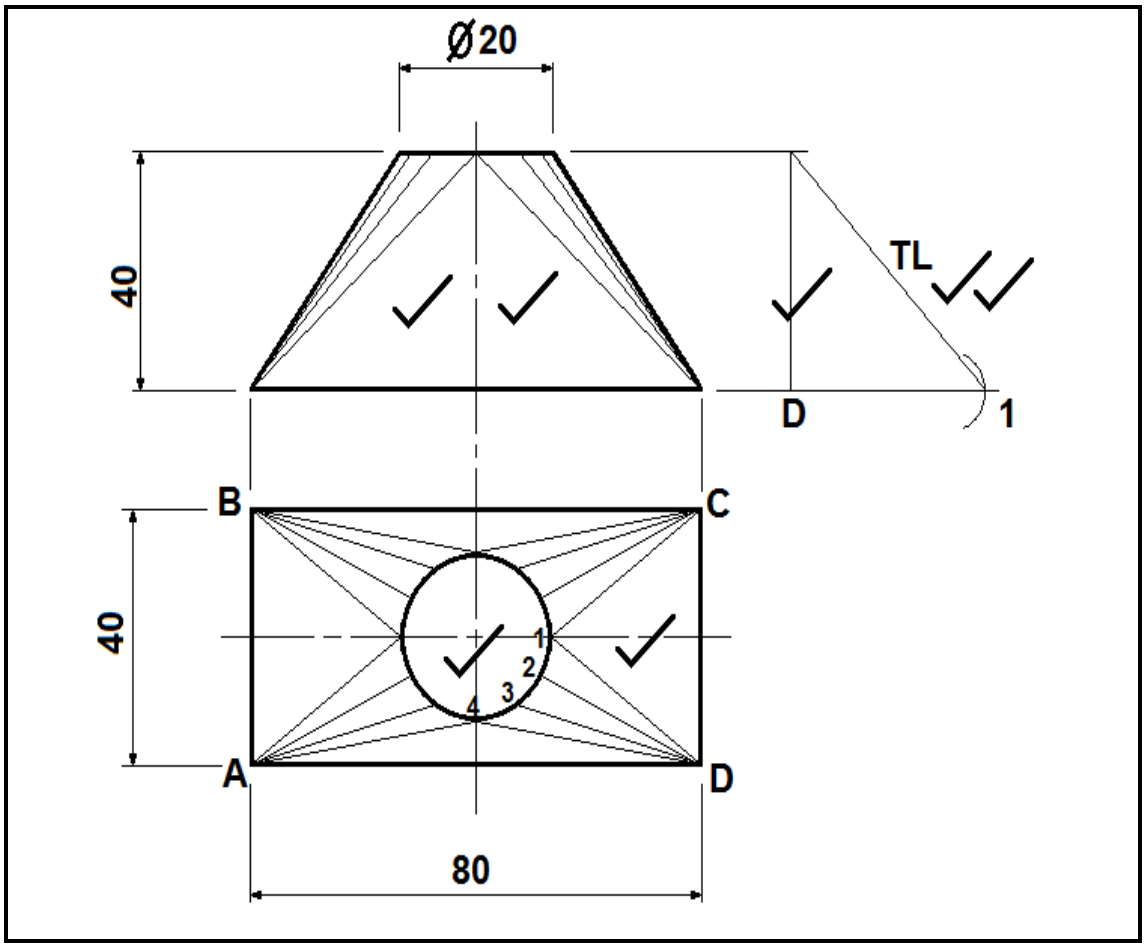
OR

R_{mean} = RO − (0, 5 × Mt)✓
= 100 − (0, 5 × 10)✓
= 100 − 5
= 95,000 mm ✓

Thus: $Circ_{mean}$ = π × D_{mean}
= π × (2 × R_{mean})✓
= π × (2 × 95)✓
= π × 190
= 596,980 mm✓

Total length = Length of curved corners + Straight sections✓
= 596,980 + (2 × 100) + (2 × 200)✓
= 1 196,980 mm✓ (3 × 3) (9)

5.2



(2 marks – front view; 2 marks – top view; 1 mark – scale;
2 marks – true length) (7 × 1) (7)

5.3 5.3.1 Blade adjustment handle
5.3.2 Balancing weight

(2 × 1) (2)
[18]

TOTAL SECTION B: 70
GRAND TOTAL: 100

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