



**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

**MACHINE MANUFACTURING
NQF LEVEL 3**

19 NOVEMBER 2019

This marking guideline consists of 6 pages.

QUESTION 1

- 1.1
- Select the correct wheel for a particular operation.
 - Ring test the wheel for any possible cracks.
 - Compare the spindle speed of the machine with that of the grinding wheel.
 - Never alter the holes of the grinding wheels.
 - Use clean blotters on either side of the wheel.
 - Tighten the nut just sufficiently enough. Do not overtighten.
 - Stand clear on one side when starting the wheel and let it run for a few seconds.
- (Any 5 × 1) (5)

- 1.2
- The operator does not wear safety goggles.
 - Measuring tools lie on top of the machine, for example, a jenny calliper
- (2)

- 1.3
- | | | |
|-------|---|--|
| 1.3.1 | C | |
| 1.3.2 | B | |
| 1.3.3 | A | |
| 1.3.4 | C | |
| 1.3.5 | A | |
- (5 × 1) (5)

- 1.4
-
- A – Counter bore
B – Countersink
C – Spot facing
- (3)
[15]

QUESTION 2

- 2.1
- | | | |
|-------|---|--|
| 2.1.1 | E | |
| 2.1.2 | D | |
| 2.1.3 | B | |
| 2.1.4 | C | |
| 2.1.5 | A | |
- (5 × 1) (5)

- 2.2
- Transmission guards ✓ – guards for pulleys and gears. ✓
Point-of-operation guards ✓ – guards around circular saws, dies and punches, and presses. ✓
- (4)

- 2.3
- Danger posed by machines can be reduced or removed altogether.
 - They promote safe working habits.
 - Injuries and accidents caused by machines can be prevented. (Any 1 × 1) (1)

| | | | |
|-----|-------|-------------|-------------|
| 2.4 | 2.4.1 | Housed | (1) |
| | 2.4.2 | Press | (1) |
| | 2.4.3 | Enter | (1) |
| | 2.4.4 | Plan; Space | (2) |
| | | | [15] |

QUESTION 3

| | | | |
|-----|---|---|-------------|
| 3.1 | 3.1.1 | Clearance fit | |
| | 3.1.2 | Transition fit | |
| | 3.1.3 | Interference fit | |
| | | | (3 × 1) (3) |
| 3.2 | It is when the shaft size is made standard and when any adjustments are made on the hole. | | (2) |
| 3.3 | 3.3.1 | Nominal diameter size of the hole and the shaft | |
| | 3.3.2 | Tolerance on the hole | |
| | 3.3.3 | Degree of tolerance on the hole | |
| | 3.3.4 | Tolerance on the shaft | |
| | 3.3.5 | Degree of tolerance on the shaft | |
| | | | (5 × 1) (5) |
| 3.4 | 3.4.1 | 100,00 mm | |
| | 3.4.2 | 100,01 mm | |
| | 3.4.3 | 99,99 mm | |
| | | | (3 × 1) (3) |
| 3.5 | <ul style="list-style-type: none"> • Allowance – refers to the difference between the size of the hole and the size shaft in a fit. • Tolerance – the variation in the size of the shaft and the hole that is accepted. | | (2) |
| | | | [15] |

QUESTION 4

| | | | |
|-----|-------|--|-----|
| 4.1 | 4.1.1 | Surface grinder✓ – It is used to grind surfaces smooth to micro-finish sizes.✓ | (2) |
| | 4.1.2 | A – Feed handle (up and down table movement) B – Magnetic table C – Cross traverse handle D – To-and-fro table traverse E – Grinding wheel | (5) |

| | | | | |
|-----|-------|---|-------------|-------------|
| 4.2 | 4.2.1 | Drive plate | | |
| | 4.2.2 | Travelling/Moving steady | | |
| | 4.2.3 | Work piece | | |
| | 4.2.4 | Carriage | | |
| | 4.2.5 | Bed | (5 × 1) | (5) |
| 4.3 | | <ul style="list-style-type: none"> • Taper turning • Parallel turning • Screw cutting • Drilling • Boring • Reaming | (Any 5 × 1) | (5) |
| 4.4 | 4.4.1 | End mill cutter | | |
| | 4.4.2 | Ball nose cutter | | |
| | 4.4.3 | T-slot | (3 × 1) | (3) |
| | | | | [20] |

QUESTION 5

| | | | | |
|-----|-------|---|-------------|-----|
| 5.1 | 5.1.1 | Arbor support | | |
| | 5.1.2 | Machine table | | |
| | 5.1.3 | Arbor | | |
| | 5.1.4 | Overarm | (4 × 1) | (4) |
| 5.2 | | Horizontal milling machine | | (1) |
| 5.3 | | <p>STEP 1: Make sure that the machine is switched OFF on the main switch.</p> <p>STEP 2: Wipe both the machine spindle and the back side of the chuck with a clean rag.</p> <p>STEP 3: Install the chuck on the machine spindle and make sure it is tightly screwed on.</p> <p>STEP 4: Clean the chuck jaws with the paint brush.</p> <p>STEP 5: Get the correct size stock material from the stores and start setting up on the centre lathe using the dial test indicator (DTI)</p> | | (5) |
| 5.4 | | <ul style="list-style-type: none"> • Gear cutting • Indexing • Drilling • Slotting • Slab milling • Gang milling • Straddle milling • Down cut milling • Up cut milling | (Any 5 × 1) | (5) |

$$5.5 \quad \text{Indexing} = 40/N \checkmark$$

$$= 40/44 \checkmark$$

$$= 10/11 \times 3/3 \checkmark$$

$$= 30/33 \checkmark$$

Indexing = No complete turns but 30 holes on 33 hole circle. ✓ (5)

- 5.6 Given: Diameter (D) = 40 mm = 0,04 m
 Length (L) = 250 mm = 0,25 m
 Cutting speed (S) = 25 m/minute
 Feed rate (f) = 0,5 mm/rev
 Required to calc. (T) = TIME in minutes and seconds

$$S = \frac{\pi \times D \times N}{60}$$

$$N = \frac{S \times 60}{\pi \times D} \checkmark$$

$$N = \frac{0,417 \times 60}{3,142 \times 0,04}$$

$$N = \frac{25,02}{0,126}$$

$$N = 198,57 \checkmark$$

$$\text{But } T = \frac{L}{f \times N}$$

$$= \frac{250}{0,5 \times 198,57} \checkmark$$

$$= \frac{250}{99,29}$$

$$= 2,518 \checkmark$$

Answer = 2 min 31 sec ✓ (5)

| | | | | |
|-----|-------|---|--------------|-------------|
| 5.7 | 5.7.1 | Turret milling machine | | (1) |
| | 5.7.2 | <ul style="list-style-type: none">• Indexing• Slotting• Keyways | (Any 2 × 1) | (2) |
| | 5.7.3 | A – Motor B – Head C – Machine table D – Saddle E – Knee F – Column G – Base | | (7) |
| | | | | [35] |
| | | | TOTAL | 100 |