



**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

**FITTING AND TURNING
NQF LEVEL 4**

22 NOVEMBER 2019

This marking guideline consists of 6 pages.

QUESTION 1: PUMPS AND COMPRESSORS

- | | | | |
|-----|--|-------------|--------------------|
| 1.1 | <ul style="list-style-type: none"> 1.1.1 C 1.1.2 B 1.1.3 D 1.1.4 B 1.1.5 B 1.1.6 C | (6 × 1) | (6) |
| 1.2 | <ul style="list-style-type: none"> • Ensure that the correct safety devices are installed. • Do not operate the pump while valve inlets and outlets are closed. • Do not use the pump for any other purpose than what it is designed for. • Do not start the pump without priming it first or checking that it is primed. | | (4) |
| 1.3 | <ul style="list-style-type: none"> • Gear pump • Helical gear screw pump • Vane pump • Flexible impeller pump | (Any 2 × 1) | (2) |
| 1.4 | Because failure to lock out driver power will result in serious injury. | | (1) |
| 1.5 | It cools the air thus reducing the volume before it enters the high pressure cylinder. | (1 × 2) | (2) |
| 1.6 | <ul style="list-style-type: none"> • Supply power to drive tool, such as pneumatic drills, jackhammers, rock drills and nail guns • Supply power to high pressure cleaners, such as those used to blast debris off surfaces • Providing the air to fill vehicle tyres • Supply power to high pressure spray painters • Controlling certain devices, such as the brakes on many vehicles | | (5)
[20] |

QUESTION 2: HYDRAULICS AND PNEUMATICS

- | | | | |
|-----|---|--|-----|
| 2.1 | <ul style="list-style-type: none"> • Wash hands and any parts of the body that have been regularly in contact with hydraulic fluid. • Wear protective gloves. • Take care when working with cleaning and degreasing substances. • Wear clean overalls on every shift. • Put up appropriate warning signs when working with hydraulic equipment, and be mindful of your own safety as well as others. | | (5) |
|-----|---|--|-----|

- 2.2 2.2.1 Directional control valves ensure that fluid flows in the correct direction.
- 2.2.2 Safety valves are activated to protect the hydraulic system from being overloaded.
- 2.2.3 Variable flow valves maintain a constant flow rate and can be adjusted to different pressures. (3 × 2) (6)
- 2.3 • Pneumatic system operates under air pressure, while hydraulic system operates under pressurised liquid.
- Pneumatic system works in an open-ended circuit, which means the air is released into the atmosphere, while hydraulic system works on a closed circuit where the fluid is directed back to the reservoir.
- Pneumatic system requires a larger cylinder than the hydraulic system to produce the same output.
- Pneumatic system uses a low-pressure fluid in comparison to the hydraulic system.
- Pneumatic system is much faster than the hydraulic system.
- Pneumatic system can operate under high temperatures while the hydraulic system cannot.
- Hydraulic systems are self-lubricating, while pneumatic system requires a lubricant for their moving parts.
- Pneumatic systems are more suitable for fire-risk areas, while hydraulic system can be very dangerous.
- Operating cost of a pneumatic system is much lower than operating costs for a hydraulic system. (Any 5 × 1) (5)
- 2.4 • Normally-closed valve is one that is closed under normal conditions and will open only when it is activated by air pressure.
- Normally-open valve is one that is open under normal conditions but will close, but not completely, when air pressure increases. (2)
- 2.5 • Kinks can cause pressure drops in the system.
- Kinks may also results in air leakage. (2)
- [20]**

QUESTION 3: SURFACE GRINDER

- 3.1 • Disc wheel or straight wheel
- Straight-cup grinding wheel
- Double-cup grinding wheel
- Flaring-cup grinding wheel
- Dish-grinding wheel (Any 4 × 1) (4)

- 3.2 3.2.1 Dressing the wheel – the purpose is to restore the cutting ability of the wheel.
- 3.2.2 Balancing the wheel – the purpose is in order to get a very fine and accurate finish and eliminate vibration of wheel. (2 × 1) (2)
- 3.3 • Mount the diamond dresser onto the magnetic base and engage the chuck.
- Make sure that the coolant is on before the diamond touches the wheel.
- Get the diamond point to touch the wheel while it is revolving and move the table across the grinding wheel face.
- Move the diamond point clear of the grinding wheel, switch off the machine and remove the diamond point from the magnetic chuck. (4)
- [10]**

QUESTION 4: CENTRE LATHE MACHINE

- 4.1 • To protect lathe operator and other workers from injury.
- To ensure that you do not forget the chuck key in the chuck.
- To preserve/contain all cutting liquid in and around the lathe. (3)
- 4.2 Outside micrometer or vernier calliper (1)
- 4.3 • Fixed steady
- Travelling steady (2)
- 4.4 D = 200 mm
- S = 250 mm/sec
- N = ? r/min
- $S = \pi \times D \times N$
- $N = \frac{S}{\pi \times D}$
- $= \frac{0,25 \times 60}{3,142 \times 0,2} \checkmark$
- $= 23,87 \text{ r/sec} \checkmark$
- $= 1432,209 \text{ r/min} \checkmark$ (3)
- 4.5 • Whether or not the machined work piece matched the specification in the engineering drawings and job card.
- The cutters that were used for the machining job.
- The quality check and measuring instruments that were used. (3)
- [12]**

QUESTION 5: MILLING MACHINE

- 5.1
- Feed rate
 - Material to be cut
 - Cutting tool condition
 - Cutting tool material
 - The general depth of the cut should not exceed the diameter of the cut more than 1,5 times.
- (5)

- 5.2 Find the number of turns of the crank handle'

$$\begin{aligned}
 \text{Index} &= \frac{40}{N} \\
 &= \frac{40}{58} \quad \checkmark \\
 &= \frac{40 \div 2}{58 \div 2} \\
 &= \frac{20}{29} \quad \checkmark
 \end{aligned}$$

You will use plate 2 which contains a 29-hole circle. Movement will be 20 holes on a 29 hole-circle. ✓

(3)

- 5.3
- End mill
 - Face cutter
 - Ball nose cutter
 - Side cutter
 - Slab cutter
 - Radius cutter
- (Any 4 × 1) (4)
[12]

QUESTION 6: CNC MILLING AND CENTRE LATHE

- 6.1
- Remove all unused tools and store them in their assigned storage area.
 - Remove all measuring equipment.
 - Clean up any spill immediately.
 - Store dirty, oily rags in a fireproof container.
 - Sweep the floor around your work area.
- (Any 4 × 1) (4)
- 6.2
- 6.2.1 Cutting tool breaks rapidly or gets blunt very quickly due to overheating.
- 6.2.2 Time lost, low production rate
- (2 × 1) (2)
- 6.3
- Import the geometry of the part to be manufactured.
 - Identify the correct tool.
 - Post the correct CNC programme to the correct machine.
- (3)

- 6.4
- Activate the desire programme that has to be altered.
 - Ensure that the Program Protect key is switched to the off position.
 - Scroll to the information that has to be changed.
 - Type the correct value in the keypad.
 - Press ALTER on the keypad to change the value.
- (5)

- 6.5 Solution:
#FL = 4
S = 68 m/min
Rpm = 720

$$\begin{aligned} \text{MMP} &= \frac{m/min}{rpm \times \#FL} \\ &= \frac{68}{720 \times 4} \checkmark \\ &= \frac{68}{2880} \checkmark \\ &= 0,0236 \text{ mm} \checkmark \end{aligned}$$

(3)

- 6.6 6.6.1 Length = 110 mm ✓
Width = 50 mm ✓

- 6.6.2 S1200 indicate the cutting speed recommended for machine which is 1200 rpm. ✓✓

- 6.6.3 N – Depicts (Indicates) the program line or block number of the written programme. ✓
T – Code specifies the tool to be placed. ✓

(3 × 2) (6)

- 6.7
- First-off or first-piece inspection/testing.
 - During or in progress inspection/testing.
 - Last-off, last piece or final inspection/testing.

(3)
[26]**TOTAL: 100**