



**higher education  
& training**

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

# **MARKING GUIDELINE**

**NATIONAL CERTIFICATE (VOCATIONAL)**

**FITTING AND TURNING  
NQF LEVEL 4**

**12 MARCH 2019**

**This marking guideline consists of 9 pages.**

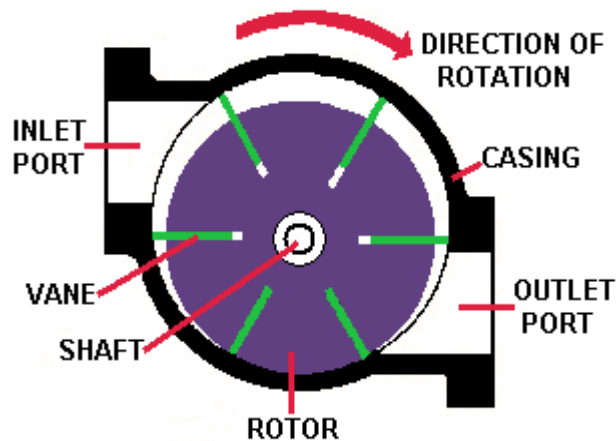
**QUESTION 1**

- 1.1
- Employees should not disregard any information or item that is in the company's health and safety policy.
  - Reasonable care should be taken in wearing of protective clothing suitable for a specific work environment.
  - All warnings signs must be obeyed and deviation should be reported to responsible persons as a matter of urgency.
  - Pump maintenance safety includes the application of personal protective equipment, assembly, dismantling start-up procedures, protective guards and other best practice procedures.
  - Always use the manufacturer's service manual as a guide to the effective maintenance and installation procedures. (Any 4 × 1) (4)
- 1.2
- Shut off all power switches and circuits breakers.
  - Allow all parts to cool down before starting work on the pump.
  - The correct personal protective clothing should be worn for the type of hazardous materials pumped.
  - If the pump was used to pump hazardous materials, remove and dispose off in a responsible manner and according to regulations.
  - Remove all electrical service fuses.
  - Lock electrical service panel supplying power to the driver.
  - Shut, wire or chain and lock all valves in pump inlet/discharge piping.
  - If applicable shut of steam or other fluid supply lines to pump. (Any 3 × 1) (3)
- 1.3
- Open impeller
  - Closed impeller
  - Semi-closed impeller (3)

**[10]**

**QUESTION 2**

2.1



(Diagram = 2 marks)  
(Any 2 labels = 2 marks) (4)

- 2.2
- Use only the correct component during maintenance or repairs.
  - Make sure you use the correct personal protective equipment.
  - Pay attention to your work to prevent accidents, personal injury, a reduction of efficiency and loss of life.
  - Watch for safety hazards and correct them first.
  - Do not attempt to remove any part before first relieving the air pressure in the system.
  - Do not do any maintenance while the machine is in operation.
  - Do not play with the compressed air.
  - Exercise cleanliness during maintenance.
  - Keep dirt away from parts and exposed openings. (Any 2 × 1) (2)

- 2.3
- Pipes or hoses
  - Air receiver
  - Relief valve
  - Air tools (Any 2 × 1) (2)

- 2.4
- Before switching on the compressor motor, make sure the electrical and mechanical isolation of equipment from other energy sources has been released.
  - Check that the belt tension and alignment are correct.
  - Make sure there is sufficient water flow to the required components, namely the inter-cooler and the after-cooler.
  - Check that the pressure gauge gives the correct reading.
  - Make sure that the pressure regulator cut-out switch is cutting out at the required pressure.
  - Ensure there are no air leakages in the system.
  - Check that all drains and valves are working efficiently. (Any 2 × 1) (2)

**[10]**

**QUESTION 3**

- 3.1      3.1.1      B  
            3.1.2      C
- (2 × 1)      (2)
- 3.2      • Transmission of power from pressure build up through the pump.  
            • Lubrication of all components as it moves through the system.  
            • Cooling of system as the fluid dissipates the heat as it is cooled down in the oil cooler.  
            • Sealing all gaps which helps with maintaining the pressure in the system.      (4)
- 3.3      • High contamination level  
            • Wrong oil viscosity  
            • High or incorrect temperature operation  
            • Cavitations in the oil  
            • Faulty circuit protection devices  
            • Wrong grade of oil      (6)
- 3.4      • Study the manufacturer's guidelines of all pneumatic tools.  
            • Wear safety goggles, safety shoes, hearing protection and other important safety equipment.  
            • Appropriate warning signs and screens should be in place warning of excessive noise and possible flying objects.  
            • Under controlled conditions blow the hose clean before it is attached to the tool.  
            • Compressor pressure must be set for the specific tool.  
            • Make sure all those connections are tight.  
            • Tools should be disconnected before maintenance or cleaning is done or tool attachments are changed.      (Any 4 × 1)      (4)
- 3.5      • Was the motor greased according to specification  
            • Was the sump oil drained and topped up with new oil  
            • Is the oil level correct  
            • Were all filters changed  
            • Is the belt tension and alignment correct  
            • Are the pressure gauges giving the right readings  
            • Is the pressure regulation switch cutting out at the correct pressure  
            • Are there any air leakages  
            • Are all drains and valves in working order  
            • Is the motor noisy  
            • Was the water drained  
            • Is the lubrication system functional      (Any 4 × 1)      (4)
- [20]**

**QUESTION 4**

- 4.1
- A wheel that is damaged can become very dangerous to you and your fellow workers when it breaks apart.
  - To assure that the correct wheel is fitted for the required work to be done. (2)
- 4.2
- Reasons
- The wheel vibrates because it is not balanced
  - The surface wheel mount fits loosely on the spindle
  - Worn spindle bearings
- Probable cause
- An unbalanced wheel can cause chatter marks on the work-piece surface.
  - An unbalanced or loosely fitted wheel can damage the machine parts such as the spindle bearings. (2)
- 4.3
- 4.3.1 Surface grinding machine (1)
- 4.3.2
- Magnetic chuck
  - Vice and parallel bars (Any ONE) (1)
- 4.3.3
- Problem
- The glazed wheel indicates that the bond is too strong and it is not allowing the blunt grit particles to break away.
  - The blunt grit particles are rubbing onto the block causing it to get hot.
  - No coolant.
- Solution
- Change the grinding wheel that has a softer bond to allow the blunt particles to break away.
  - Use coolant. (3)
- 4.4
- The block and the machine needs to be cleaned because, particles that are between the block machine surfaces could affect the parallel measurements between the two sides. (1)
- [10]**

**QUESTION 5**

5.1 S = 22 m/min D = 50 mm or 0,05 m

$$S = \pi \times D \times N$$

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

$$= \frac{22}{\pi \times 0,05} \checkmark$$

$$= 140 \text{ r/min} \checkmark$$

(3)

- 5.2
- Inspect the lathe to make sure that the lathe bed is oiled and that there is sufficient oil in the headstock.
  - Make sure the lathe is anchored securely to the floor.
  - Inspect power supply cables and the emergency stop to ensure they are in good working order.
  - Inspect the guards to make sure they are in position and in good working condition before operating.
  - Inspect the levers on the lathe to make sure they are all working properly.
  - Ensure that the correct screw-cutting tool is properly mounted.

(Any 4 × 1)

(4)

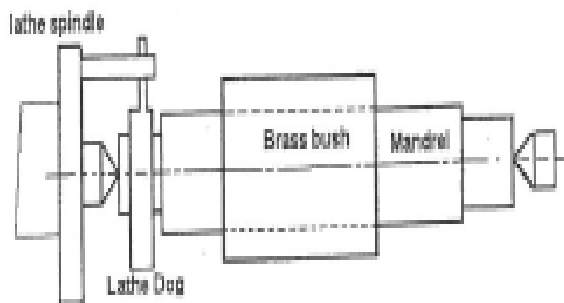
5.3 5.3.1 There should be no play or backlash on the wheel or dial.

5.3.2 If the hand wheels and dials are not functioning properly it will compromise the quality and accuracy of the work-piece

(2 × 1)

(2)

	DESCRIPTION	MARKS
5.4	Show the centres	1
	Show the mandrel between the centres	1
	Show the bush fitted on the mandrel	1
	<b>TOTAL</b>	<b>3</b>



(3)  
[12]

**QUESTION 6**

- 6.1 6.1.1 The cutter cuts the dovetail as per the specifications provided.
- 6.1.2 In instances where two sides join by means of a slight radius. (2 × 1) (2)
- 6.2
- Simple indexing – Performed when rapid indexing of a certain number of divisions is not possible.
  - Rapid indexing – When speed is required for an operation to be performed.
  - Angular indexing – When using the ratio of the crank handle to the spindle.
  - Differential indexing – Performed on grooves or slots requiring a prime number of divisions. (Any 3 × 2) (6)
- 6.3 Angle = 120°
- Indexing =  $\frac{\theta}{9^\circ}$
- =  $\frac{120}{9}$  ✓
- = 13  $\frac{3}{9}$  ✓
- = 13[  $\frac{3}{9} \times \frac{6}{6}$  ] ✓
- = 13 full turns and 18 holes in a 54 hole plate ✓ (4)
- [12]**

**QUESTION 7**

- 7.1 Keep hands and personal clothing clear of the chuck jaws when changing the work-piece. (1)
- 7.2
- Reduction in labour costs
  - Increased productivity
  - All the machined components are the same
  - The programmes can be used over and over again
  - Better safety features to protect the operator
  - Machines can run for long hours at a time (Any ONE) (1)
- 7.3
- Any wrong instructions need to be edited to avoid damage to the machine.
  - Avoid damage to the machine.
  - Prevent damage to the components.
  - Wrong parts can be produced which results in time lost and fruitless expenditure. (Any 2 × 1) (2)

## FITTING AND TURNING L4

- 7.4
- Emergency stop button – Used to shut down the machine as soon as the operator finds that something is wrong while the machine is in operation.
  - Machine guard – Protects the operator from any moving parts.
  - Door lock or switch – Can operate automatically or manually to prevent any person from getting in contact with the cutter while it is in operation.
  - Contact mats – That will stop the machine as soon as the operator steps on it.
  - Pneumatic, hydraulic or electro pneumatic foot device – Allows the operator to stop or start the machine as required. (Any 4 × 1) (4)
- 7.5
- Always choose the biggest possible tool holder for the job.
  - Make sure that there is enough room for chip evacuation.
  - Always keep the overhang of the tool to a minimum without risk. (3)
- 7.6
- Check tool insert tip for any damage.
  - Sufficient spare inserts for all the tools.
  - Correct size Allen keys are available for the tools being used.
  - Inside diameter tools are extended to the length required and not more.
  - Inside diameter tools are positioned opposite each other in the turret and not side by side.
  - Slides at the back of the turret are properly oiled. (Any 4 × 1) (4)
- 7.7
- 7.7.1 Need to be attentive and in control at all times to notice early on if any problems are about to occur.
- 7.7.2 Any problems must be reported and shown to the person in charge.
- 7.7.3 You must come up with a way to change the process so that minimum time is lost and the job can carry on.
- 7.7.4 You need to report the way in which you went about rectifying the problem to the supervisor. The supervisor will decide if the milling operation may continue. (4 × 1) (4)
- 7.8 Quality control implies that different components are numbered and then measured and the dimensions written down next to the appropriate item. On completion of the measurements, all the details are transferred to a finished inspection report and compared to given drawing. (2)



