



higher education
& training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

FITTING AND TURNING

NQF LEVEL 4

4 March 2024

This marking guideline consists of 7 pages.

INSTRUCTIONS TO MARKERS

1. Mark all the questions.
 2. Follow the answers according to the numbering system used in this question paper.
 3. Use only a red pen.
 4. Put your ticks and crosses neatly and legibly.
-

QUESTION 1: PUMP AND COMPRESSOR

- 1.1
- Open impeller
 - Closed impeller
 - Semi-closed impeller
- (3)
- 1.2
- The importance of using the correct tools and equipment is that you can do your job efficiently without damaging any components.
 - Cleaning parts of a compressor will help you to identify and correct parts ordered or fitted.
 - Correct protective equipment will help protect you from serious injury.
- (3)
- 1.3
- Always read the owner's manual before doing any compressor repair or carrying out service on your compressor.
 - Do not use an air compressor in wet or damp areas.
 - Take special care of compressor components when doing maintenance work on a compressor.
- (3)
- 1.4
- The ON/OFF switch is switched off and the lock-out device is used.✓ This is to isolate equipment electrically from other energy resources.✓
- (2)
- 1.5
- Check that the alignment of the shaft and impeller is correct by moving them by hand to ensure that they have free movement.
 - Check that all components such as keys, bolts and nuts are tight and in place.
 - Measure the clearance between the shaft and the impeller, do a visual inspection and switch on the machine to ensure that the pump's operation is in order.
- (3)
- 1.6
- 1.6.1 Single stage-reciprocating compressor
- (2)
- 1.6.2 As the piston moves down, the one-way valve on the inlet side is forced open.✓ Air is then sucked into the cylinder as the piston moves down.✓
When the piston moves up the one-way valve on the discharge side is forced open,✓ and air leaves the cylinder under pressure.✓
- (4)

[20]

QUESTION 2 HYDRAULIC AND PNEUMATIC SYSTEM

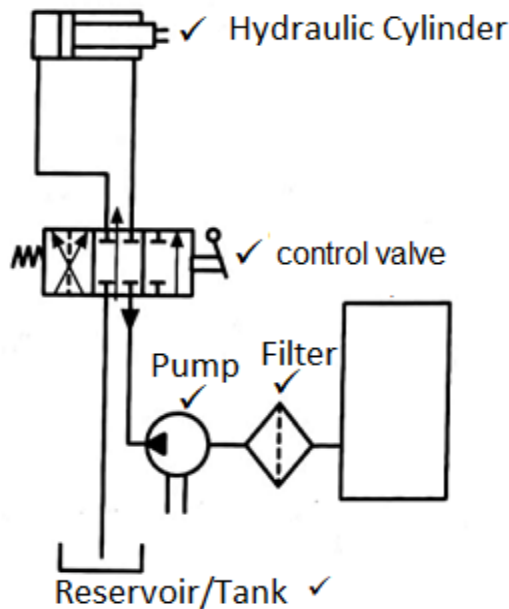
- 2.1 2.1.1 False
- 2.1.2 False
- 2.1.3 True
- 2.1.4 False
- 2.1.5 True

(5 × 1) (5)

- 2.2 • There might be a blockage in the pipes.
- There might not be enough hydraulic oil in the reservoir/tank.
- There might be loose connections on the pipe and components.
- Some of the components might be damaged.

(4)

2.3



(Or any applicable drawing) (5)

- 2.4 • Correct cleaning agent must be utilised for cleaning of parts.
- Use filtered masks and safety glasses to protect your eyes.
- Use recommended tools and equipment for maintenance and repair activities, as accidents can occur if incorrect tools and equipment are used.
- Protective equipment should be in line with workshop requirements to ensure the safety of all workers at all times.

(4)

- 2.5 Naming the tool or equipment and a description of all defects on the tools and equipment.

(2)

[20]

QUESTION 3: SURFACE GRINDING

- 3.1 Because if one side of the grinding wheel is damaged, the grinding wheel can be turned around. (2)
- 3.2
- Mount the diamond wheel tool dresser onto the magnet chuck and engage the chuck.
 - If using a wet machine, make sure that the coolant is on before the diamond point touches the grinding wheel.
 - Get the diamond point to touch the grinding wheel while it is revolving. Move the table across the grinding wheel face at a very slow rate to get the finest possible finish on the grinding wheel face.
 - Move the diamond point clear of the grinding wheel, switch off the grinding wheel and remove the diamond point from the magnetic chuck. Then adjust the height of the grinding wheel. (4)
- 3.3
- Incorrect hydraulic oil is used.
 - Hydraulic pump not delivering sufficient oil because of oil level being low.
 - The suction of dirt is inadequate.
 - There is air in the cylinder. (Any 2 × 2) (4)

[10]

QUESTION 4: LATHE AND MILLING MACHINE

- 4.1
- Faceplates
 - Chucks
 - Lathe steadies
 - Lathe centres
 - Flat spanners
 - Vernier callipers
 - Micrometers
 - Tool holders
 - Mandrels
 - Chuck key
 - Slip gauges
 - Knurling tool
 - Cutting tools
 - Dial Indicators
- (Any 5 × 1) (5)
- 4.2 This means that the specified dimension can be a maximum of 0,05 mm oversize✓ and a minimum of 0,05 mm undersize.✓ (2)
- 4.3 It is used as a reference for the setting of measuring equipment used in the machine shop, such as micrometres, sine bars and dial indicators. (2)
- 4.4
- The cutting tool becomes blunt.
 - The cutting tool becomes too hot.
 - The machining process is taking too long to complete.
- (3)
- 4.5
- Cutting speed.
 - Spindle speed.
 - Diameter of the tool.
 - Feed rate.
 - Depth of cut.
 - Condition to tool
- (Any 3 × 1) (3)
- 4.6
- The milling cutter holder is fitted on the adaptor that fits tightly into the spindle taper.
 - The milling cutter can also be mounted onto the milling machine arbour placed in the centre of the arbour between the spacing collars and then locked in position.
- (2 × 2) (4)
- 4.7 Dial clock gauge (1)
- 4.8
- Move the coolant pipe to the side and remove all attachments, tools, and related equipment from the machine.
 - Clear all cutting or shavings from the top of the machine.
 - After all cleaning has been completed, brush the table bed and slides and then wipe them with a clean cloth.
 - Then use a recommended oil to put a fine layer of lubricant on the beds and slides in and around the milling machine.
- (4)

[24]

QUESTION 5: CNC LATHE AND MILLING MACHINE

- 5.1 5.1.1 For checking the presence of syntax errors, such as incorrect codes.
- 5.1.2 For checking motion errors and correctness of spindle direction concerning the tooltip.
- 5.1.3 For determining possible collisions, check tool turret motions regarding safe positions for cutting or changing. (3 × 2) (6)
- 5.2 5.2.1 The purpose of this code is to remove all excess material which is not required, as quickly as possible.
- 5.2.2 To refine the product that was produced by roughing cycle and bring it within the specified tolerances that are allowed. (2 × 2) (4)
- 5.3 It saves time because instead of travelling the entire four meters, you can now programme a second reference closer to the material that should be cut. (2)
- 5.4 That helps to determine the need for corrective action in the manufacturing process and that will help companies to meet customer requirements. (2)
- 5.5 That allows you to set up a new programme zero in the centre of the product and just reflect it as G 54 in the program itself instead of recalculating all the measurements to origin point. (2)
- 5.6 It lists all the detail of how the operation needs to be performed on the component. (2)
- 5.7
 - Wear safety glasses.
 - Wear safety boots.
 - Wear gloves when handling material.
 - Keep overalls buttoned up.
 - Sleeves must be rolled up or folded in and cuffs must be pinned up.
 - Ensure that all guards are in position before starting the lathe.
 - Ensure the work area around the lathe is clean and that the floor is not slippery.
 - Keep hands away from moving parts.
 - Use only the correct machine tools to make adjustments. (Any 5 × 1) (5)
- 5.8 Data give: $\varnothing = 35 \text{ mm}$,
 # FL = 2
 MMTP = 0,025
- Solution:
 Feed = rpm × MMPT × 2
 = (540 × 0,025) × 2 ✓
 = 13,5 × 2 ✓
 = 27 mm/min ✓ (3)

[26]**TOTAL: 100**