



**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 2024



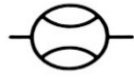
This marking guideline consists of 5 pages.

QUESTION 1: PUMPS AND COMPRESSOR

- | | | | | |
|-----|---|--|------------------------------|-----|
| 1.1 | 1.1.1 | False | | |
| | 1.1.2 | True | | |
| | 1.1.3 | False | | |
| | 1.1.4 | True | | |
| | 1.1.5 | True | (5 × 1) | (5) |
| | | | | |
| 1.2 | 1.2.1 | During the reporting process based on the workshop policy, it is recommended that all defects and defective equipment be reported as and when the defects occur.✓✓ | | |
| | 1.2.2 | Information regarding the complete task needs to be recorded fully and accurately as soon as the job has been completed.✓✓ | | |
| | 1.2.3 | In the workshop and the plant maintenance zone, it is critical that tools and equipment be examined, cleaned and stored in a safe environment.✓✓ | (3 × 2) | (6) |
| | | | | |
| 1.3 | <ul style="list-style-type: none"> • Lobe compressor • Vane compressor • Rotary screw compressor • Rotary air compressor • Reciprocation piston compressor • Scroll compressor | | (Any three relevant answers) | (3) |
| | | | | |
| 1.4 | <ul style="list-style-type: none"> • Air is first admitted to a low-pressure cylinder✓ and then discharged into an inter-cooler.✓ • At the inter-cooler, the pressurised air is cooled down✓ before entering the high-pressure cylinder.✓ • Here the air is compressed to its final pressure, from where it is delivered through an after-cooler that cools the air before✓ it moves to the air receiver where it gets stored for external use.✓ | | (3 × 2) | (6) |

[20]**QUESTION 2: HYDRAULICS AND PNEUMATICS**

- | | | | | |
|-----|---|--|---------|-----|
| 2.1 | <ul style="list-style-type: none"> • Pressure✓ refers to a measurement of force per unit area that acts on an object in the fluid on a closed containers surface. The ISO unit for pressure is Pascal (Pa).✓ • Volumetric flow rate✓ refers to the volume of fluid that is passing through a given cross sectional area per unit of time. The ISO unit for volumetric flow rate flow is litres per second (l/s) or cubic metres per second (m³/s).✓ • Area✓ is when air flowing through pipes of varying diameters during any time will have the same volume at all points. The ISO unit for area is metres squared (m)².✓ | | (3 × 2) | (6) |
|-----|---|--|---------|-----|

- 2.2 Because the use of any unidentifiable cleaning agent may be harmful to the skin and eyes of an operator.✓✓ (2)
- 2.3
- Pressure in the system that does not meet the operational (circuit) requirements.✓✓
 - Kinks in pipes or leaks in the system.✓✓
- (Any two relevant answers) (2 × 2) (4)
- 2.4
- | | | | |
|-----|-------|--------------------|--|
| 2.4 | 2.4.1 | Linear actuator | |
| | 2.4.2 | Filter or strainer | |
| | 2.4.3 | Flow valve | |
| | 2.4.4 | Exhaust valve | |
| | 2.4.5 | Hydraulic motor | |
- (5 × 1) (5)
- 2.5
- | | | | |
|-----|-------|--|--|
| 2.5 | 2.5.1 |  | |
| | 2.5.2 |  | |
| | 2.5.3 |  | |
- (3 × 1) (3)
- [20]**

QUESTION 3: GRINDING MACHINE

- 3.1
- Clean and remove all burrs from the work piece and make sure that the magnetic base is clean of metal filings.
 - Place a piece of paper between the workpiece and the magnetic base to prevent the workpiece or magnetic base surface from damage.
- (2)
- 3.2
- The surface grinding operation can only be started once all safety procedures have been followed and all settings are correct.
 - Once one is satisfied that every safety aspect has been taken into consideration and applied, one may start the machine.
 - Stand aside and let the machine run for approximately five minutes to allow the lubrication of the table components to be completed.
 - Once this process is done, one may set the cutting depth of the grinding wheel.
- (4)
- 3.3
- | | | | |
|-----|-------|--|--|
| 3.3 | 3.3.1 | When one has checked the surface finish of the machined components, one must check the dimension(measurements) against its required specification.✓✓ | |
| | 3.3.2 | The values and tolerance that need to be checked are identified from the drawing and other appropriate job specifications that have been provided.✓✓ | |
- (2 × 2) (4)
- [10]**

QUESTION 4: CENTRE LATHE AND MILLING MACHINE

- 4.1
- Inspect the lathe to make sure that the centre lathe bed is oiled and that there is sufficient oil in the headstock.
 - Make sure that the centre lathe is anchored to the floor.
 - Inspect power supply cables and the emergency stop to ensure that they are in good working condition.
 - Inspect guards to make sure that they are in position and in good working condition before operating the machine.
 - Inspect the levers on the centre lathe to make sure that they are working properly.
- (accept any other relevant answer) (5)
- 4.2
- The operator must select the cutting tool based on the requirements of the job.✓✓
 - The selected cutter must then be clamped with bolts into the bracket in the tool post.✓✓
 - It must protrude approximately 10 mm from the tool post so that it has the correct overhang.✓✓
- (3 × 2) (6)
- 4.3
- | | | | |
|-------|--------------|--|--|
| 4.3.1 | Slab milling | | |
| 4.3.2 | Face milling | | |
| 4.3.3 | Slot cutting | | |
- (3 × 1) (3)
- 4.4
- Colour code painted on the material by manufacturer
 - Spark test
 - Looking at the appearance
 - Manufacturer's stamp
- (4)
- 4.5
- For machining to take place, the worm and the worm gear are disengaged.✓✓
 - The indicated grooves to be machined are set on the index to start the initial cutting.✓✓
 - The worm and worm gear are then engaged for the next operation on the same machine.✓✓
- (3 × 2) (6)
- [24]**

QUESTION 5: CNC CENTRE LATHE AND MILLING MACHINE

- 5.1
- Study the operator and maintenance manuals and read all warnings on the machine before turning it on.
 - Let the machine and spindle come to a complete stop before opening the door.
 - Ensure that the work piece and tools are secured properly.
 - Do not use tools for which one has not been trained to use.
 - Carefully inspect tools every time before they are them.
- (Any relevant answers) (4)

- 5.2
- Run a chip conveyor at the end of the workday.✓✓
 - Use a paint brush/hook wire to clean off stray chips/shavings and debris.✓✓
- (2 × 2) (4)
- 5.3 The worn tip is loosened by means of an Allen key and then turned around and fitted into the holder.✓✓
- (2)
- 5.4
- 5.4.1 G41 code (cutter compensation left) is used to move the CNC control tool to the left of the programme path to compensate for the size of the cutting tool.✓✓
- 5.4.2 G42 code (cutter compensation right) is used to move the CNC control tool to the right of the programme path to compensate for the size of the cutting tool.✓✓
- (2 × 2) (4)
- 5.5
- Cutting tips should be free of any damages.
 - Sufficient spare inserts for all the tools.
 - Correct size of Allen keys is available for the tools being used.
 - Inside diameter tools are extended to the required length.
 - 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 5 × 1) (5)
- 5.6
- A DNC system transfers CNC part programmes between a computer and a CNC machine's programme memory.✓✓
 - One can let the CNC programme run directly from a computer.✓✓
- (2 × 2) (4)
- 5.7 Solution:
- R/min = 650
#Flute = 2
MMPT = 0.02
- Feed = r/min × MMPT × #FL
= (650 × 0,02) × 2✓
= 13 × 2✓
= 26 mm/min✓
- (3)
[26]
- TOTAL: 100**