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.**

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## 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
- Lobe compressor
- Vane compressor
- Rotary screw compressor
- Rotary air compressor
- Reciprocation piston compressor
- Scroll compressor

(Any three relevant answers) (3)

1.4
- 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
- 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 ($m^3/s$).✓
- 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)

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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.✓✓

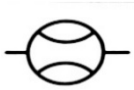
(Any two relevant answers) (2 × 2) (4)

2.4
2.4.1 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 2.5.1 

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 3.3.1 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)

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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**

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