



**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

**FITTING AND TURNING
NQF LEVEL 4**

26 March 2021

This marking guideline consists of 6 pages.

QUESTION 1: PUMPS AND COMPRESSORS

- | | | |
|-----|---|--------------------|
| 1.1 | 1.1.1 C
1.1.2 D
1.1.3 B
1.1.4 D
1.1.5 A | (5 × 1) (5) |
| 1.2 | <ul style="list-style-type: none"> • Bearings • Mechanical seals • Gasket • O-rings | (4) |
| 1.3 | 1.3.1 Condition of moving components
1.3.2 No air leakage or twisting
1.3.3 Wear of belt, condition of pulley and bearing.
1.3.4 Air filter not clogged with dirt
1.3.5 Condition of motor bearings, noises and heat | (5 × 1) (5) |
| 1.4 | <ul style="list-style-type: none"> • Ensure releasing of electrical and mechanical isolation of equipment from other sources • Correct belt tension and alignment • Correct reading by pressure gauges • Sufficient water flow to required components • No leakages in system • Drains and valves working correctly • No noises coming from motor • Compressor components working correctly | (Any 5 × 1) (5) |
| 1.5 | To prevent someone from switching on machine while someone is working on it. | (1)
[20] |

QUESTION 2: HYDRAULICS AND PNEUMATICS

- 2.1
- Pressure source (Compressor)
 - Piping
 - Service unit
 - Valve
 - Actuator
- (5)
- 2.2 Hydraulic system uses fluid for power transmission while pneumatic system uses air (2)
- 2.3 Quick release of air (2)
- 2.4
- Leakage of hydraulic fluid
 - Excessive noise
 - Electric shock.
 - Accidental machine movement
- (Any 3 × 1) (3)
- 2.5
- Preventing damage to hydraulic equipment
 - Ensuring correct maintenance, repair or installation
 - Minimising health and safety risk to personnel
- (3)
- 2.6
- | | | | |
|-------|-----------------------|--|--|
| 2.6.1 | Pressure relief valve | | |
| 2.6.2 | Variable flow valve | | |
| 2.6.3 | Safety valve | | |
| 2.6.4 | Throttle valve | | |
| 2.6.5 | Shut-off valve | | |
- (5 × 1) (5)
- [20]**

QUESTION 3: SURFACE GRINDER

- 3.1
- | | | | |
|-------|------------------------------|--|--|
| 3.1.1 | Flaring-cup grinding wheel | | |
| 3.1.2 | Dish-grinding grinding wheel | | |
| 3.1.3 | Straight-cup grinding wheel | | |
| 3.1.4 | Disc wheel or straight wheel | | |
- (4 × 1) (4)
- 3.2 Used to dress, clean or restore sharpness of grinding wheel on surface grinder (1)

- 3.3
- Power supply
 - Spindle stop, start and reverse controls
 - Hand wheels and feed dials
 - Spindle-speed selection levers
 - Feed-selection levers
 - Feed-engagement levers
 - Power feed control
 - Cutting fluid supply
 - Emergency stop control
- (Any 5 × 1) (5)
[10]

QUESTION 4: CENTRE LATHE

- 4.1
- Use chuck key to open jaw of chuck
 - Insert workpiece into jaw
 - Turn chuck to close and fasten workpiece
- (3)
- 4.2
- Safety goggles
 - Hearing protection
 - Steel-capped safety shoes
 - Suitable overall
- (Any 3 × 1) (3)
- 4.3
- Whether machined workpiece matched specifications in engineering drawings and job card
 - Cutter used for machining job
 - Quality checks and measuring instrument used
- (3)
- 4.4
- Set cutter against work piece
 - Adjust cutting depth
- (2)
- 4.5 Vernier calliper
- (1)
[12]

QUESTION 5: MILLING MACHINE

- 5.1
- Move the table by hand, ensuring that it moves freely and mount clock in spindle.
 - As table moves up to touch clock, reading is given. Dial test indicator must be zero
 - Move spindle to all four corners, reading zero degree at each point (3 × 1)
- (3)
- 5.2 To ensure life span of cutters✓, to keep cutter cool and wash away shavings✓
- (2)

5.3 To withstand vibrations✓ occurring during machining and prevent accidents ✓ (2)

5.4 Use set of parallels/parallel bars. (1)

5.5 Step 1: Find number of turns of crank handle

$$\text{Index} = \frac{40}{N}$$

$$= \frac{40}{36}$$

$$= 1\frac{4}{36}$$

1 full turn = 4 holes in 36-hole circle✓

There are no 36-hole circles, so a plate that is divisible by 36 must be selected from the Brown and Sharpe dividing head table.✓

Step 2: Find number of holes on Index plate

$$\text{Number of holes} = \frac{4}{36}$$

$$= \frac{2}{18}✓$$

2 holes in an 18-hole circle✓

Step 3: Answer: 1 full turn of crank handle, 2 holes on an 18-holes circle✓✓ (6)
[14]

QUESTION 6: CNC CENTRE LATHE AND MILLING MACHINES

6.1

- Remove completed material from chuck
- Remove all shavings from machine
- Do not clean machine with compressed air
- Clean spindle with clean cloth to prevent corrosion
- Move turret to safe position before powering off (Any 4 × 1) (4)

6.2

- Acquire correct material, in correct sequence and quantity as specified on drawing.
- Decide how to clamp workpiece.
- Set machine to correct feeds and speeds.
- Select correct tools and equipment.
- Determine machining process.
- When the job is done, isolate the machine from electrical power supply.
- Clean the work area and the machine. (7)

- 6.3
- In order to set the Z-axis, the tool needs to be advanced to the face of the workpiece facing face zero.
 - In order to set up the X-axis measure the workpiece with Vernier calliper or outside micrometer facing zero. (2 × 2) (4)
- 6.4
- Ensure tool has correct shape or profile for job
 - Ensure cutting tool has correct side clearance angle. (2)
- 6.5
- 6.5.1 Face tool: Facing on the lathe uses a facing tool to cut a flat surface perpendicular to the work piece's rotational axis.
- 6.5.2 Flat-nose mills: Commonly referred to as Flat End Mills or square end mills, produce a sharp edge at the bottom of the slots and pockets of the workpiece. They are used for general milling applications including slotting, profiling and plunge cutting
- 6.5.3 Centre drills: The purpose of the centre drill is to create an accurate centre hole in the face of a job so as a centre can be inserted to support the weight and load of the job, whilst turning it.
- 6.5.4 Drill bits: Drill bits are cutting tools used to remove material to create holes, always of circular cross-section. (4 × 1) (4)
- 6.6
- First inspection to ensure consistency and repeatability of process and machining
 - In-progress inspection after first piece has been approved
 - Last inspection to ensure product manufacturing process was successful (3)

[24]**TOTAL: 100**