



**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 2018

This marking guideline consists of 8 pages.

QUESTION 1: PUMPS

- 1.1
- Employees should not disregard any information or item that is in the company health and safety policy.
 - Protective clothing suitable for a specific work environment should be worn.
 - Warning signs must be obeyed and any deviation should be reported to responsible persons as a matter of urgency.
 - Pump maintenance safety includes the application of personal protective equipment, assembly, protective guards and other best practice procedures.
 - Always use the manufacturer's services manual as a guide to the effective maintenance and installation procedures. (Any 3 × 1) (3)
- 1.2
- Vane pump
 - Gear pump
 - Helical gear screw pump
 - Flexible impeller pump (Any 2 × 1) (2)
- 1.3
- An offset rotor within a larger cylinder drives it. As the rotor turns, the vanes move liquid through the pump✓. On the inlet side, sliding vanes create cavities, which are filled with liquid✓. As the rotor turns, the liquid is moved to the outlet side where, as the vanes slide back in, space is contracted and the liquid is forced out under pressure✓. (3)
- 1.4
- To ensure the safety of people and to minimise damage to machines and equipment.
 - To evaluate the condition of the repaired pump equipment.
 - To evaluate the safety of repaired equipment. (Any 2 × 1) (2)
- [10]

QUESTION 2: COMPRESSORS

- 2.1
- Make provision for the health and safety of all persons at work.
 - Protects persons, other than persons at work, against threats or hazards to their health and safety arising from the activities of persons carrying out their workplace duties.
 - Makes provision for the establishment of an advisory council for the purpose of occupational health and safety. (Any 2 × 1) (2)
- 2.2
- Providing the air to fill vehicle tyres.
 - Supplying power to drive tools (pneumatic tools).
 - Supplying power to high-pressure cleaners.
 - Supplying power to high-pressure spray painters.
 - It is used to activate brakes and devices using pneumatic brakes. (Any 3 × 1) (3)

2.3	2.3.1	Lobe compressor	(1)
	2.3.2	<ul style="list-style-type: none">• Lobes• Compressor housing or housing	(2)
	2.2.3	Positive displacement	(1)
2.4		Clean them by using a soft cloth and cleaning liquid.	(1)
			[10]

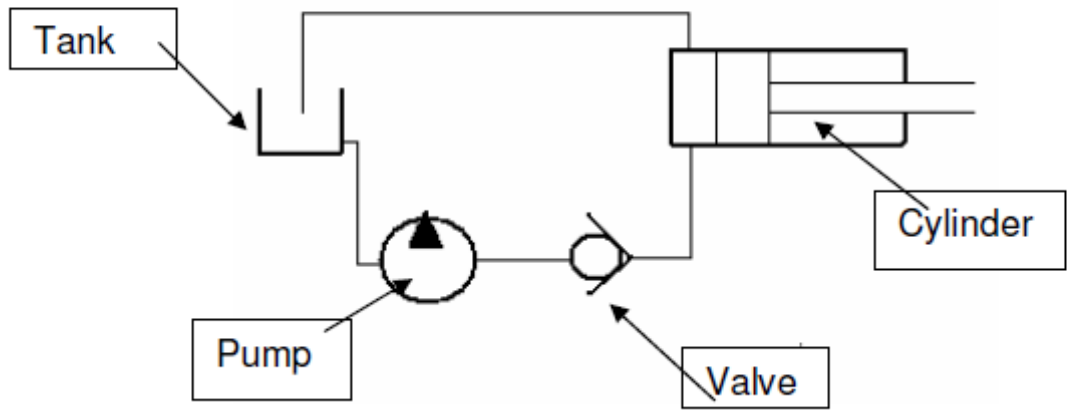
QUESTION 3: HYDRAULIC AND PNEUMATICS

3.1	<ul style="list-style-type: none">• External and internal leaks within the system can cause a drop in pressure• Dirt or foreign materials get into the oil that can block or clog up the passages• Power loss can occur due to internal friction between the oil and the mechanical parts• The oil loses its chemical properties when it comes in contact with other fluids or materials.	(4)
3.2	<ul style="list-style-type: none">• Inspect any parts that are subjects to high pressure• Ensure that the drive coupling fits properly on the drive shaft• Fill cylinders with clean hydraulic fluid before connecting them to service lines• Correctly fill motors with hydraulic fluid and lubrication• Depending on the pump specifications, different steps are required after installation.	(5)
3.3	<ul style="list-style-type: none">• Broken or cracked hoses• Broken pipe lines• Faulty pipe connections• Faulty hose couplings• Broken seals	(4)

3.4

Description	Marks
Draw and label the tank	2
Draw and label the pump	2
Draw and label the valve	2
Draw and label the cylinder	2
TOTAL	8

Simple hydraulic system



(8)
[21]

QUESTION 4: SURFACE GRINDING

- 4.1
- Wear gloves when large or heavy objects should be loaded on the machine.
 - Wear safety goggles.
 - Wear safety boots.
 - Wear overall buttoned up.
 - Hairnet where the operator has long hair.
 - Avoid loose hanging clothes.
- (Any 5 × 1) (5)
- 4.2
- 4.2.1 Where material removed is parallel to the axis of the grinding wheel.
- 4.2.2 Where material is removed perpendicular to the axis of the grinding wheel.
- (2 × 1) (2)

- 4.3 4.3.1
- Grinding wheel pressure to high.
 - Slow table speed.
 - Cut to deep (Too much material removed).
 - Grinding wheel to hard.
 - Dull or clogged wheel.
 - Not enough coolant. (Any 1 × 1) (1)
- 4.3.2
- The wheel spindle is worn out or the wheel must be trued.
 - Machine base levelling screws are not secured.
 - Loose flanges that holds the grinding wheel.
 - Too much pressure on the grinding spindle.
 - Motor/Spindle connection point not secure.
 - Worn wheel spindle.
 - Machine loose in its foundation. (Any 1 × 1) (1)
- 4.3.3
- Dirty coolant
 - Loose particles that falls from the machine guard
 - Grinding wheel to hard (Any 1 × 1) (1)
- [10]**

QUESTION 5: CENTRE LATHE

- 5.1 5.1.1 B
5.1.2 D
5.1.3 C
(3 × 1) (3)
- 5.2
- Make sure lathe bed is oiled.
 - Check headstock oil level.
 - Make sure the coolant supply is working.
 - Make sure the machine is anchored adequately.
 - Make sure all machine guards are in place and fixed properly.
 - Check power supply cables for damage.
 - Test emergency stop.
 - Check that all machine levers are working properly. (Any 4 × 1) (4)
- 5.3 $S = \pi \times D \times N$
- $$N = \frac{S}{\pi \times D}$$
- $$= \frac{90}{\pi \times 0,04} \checkmark$$
- $$= \underline{716 \text{ r/min}} \checkmark \quad (3)$$
- $$= \underline{12 \text{ r/s}} \checkmark$$
- 5.4 5.4.1 Telescopic gauges are used to accurately measure inside diameters of workpieces.
- 5.4.2 Thread pitch gauges accurately verifies if a tread with the correct pitch has been cut. Also gives an indication if the shape of the tread is correct. (2 × 1) (2)

[12]

QUESTION 6: MILLING MACHINE

- 6.1
- Worm
 - Worm wheel
 - Index plank
 - Index crank
 - Plates
 - Sector arms
- (Any 2 × 1) (2)

6.2 $S = \pi \times D \times N$

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

$$= \frac{24}{\pi \times 0,1} \checkmark$$

$$= \underline{76,394} \text{ r/min} \checkmark$$

$$f = F \times T \times N \checkmark$$

$$= 0,051 \times 14 \times 76,394 \checkmark$$

$$= \underline{54,55} \text{ mm/min} \checkmark$$

(5)

6.3 Indexing = $\frac{\theta}{9^\circ}$

$$= \frac{50}{9}$$

$$= 5 \frac{5}{9} \checkmark$$

$$= \frac{5}{9} \times \frac{6}{6} \checkmark$$

$$= \frac{30}{54}$$

$$= 5 \text{ full turns and } 30 \text{ holes in a } 54 \text{ hole circle} \checkmark$$

(3)

- 6.4
- Check that the cutter is tight enough.
 - Check that the cutter is not blunt.
 - Ensure enough cutting fluid available.
 - Check that workpiece is properly clamped.
 - Control the depth of the cut.
- (Any 2 × 1) (2)

[12]

QUESTION 7: CNC MILLING AND TURNING

- 7.1
- Can manufacture large numbers of components to exact standards.
 - Cost effective.
 - Can work without stopping for 24 hours per day.
 - Can work without human supervision.
 - Can detect errors and breakdowns. (Any 2 × 1) (2)
- 7.2
- The emergency stop button✓ is used to shut down the machine as soon as the operator finds something is wrong while the machine is in operation.✓
 - The 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 operating devices that allows the operator to stop or start the machine as required.✓ (Any 3 × 2) (6)
- 7.3
- The tools must be in a good working condition and the right length et cetera.
 - Fitted/mounted in the correct tool holders as per the programme instruction. (2)
- 7.4
- A computer with which to draw the design.
 - An interface which converts the data from the computer to a form that the CNC machine understands.
 - The CNC machine where the data signals from the interface control the motors on the CNC machine to cut the workpiece. (3)
- 7.5
- It simply means that the programmer needs not to take the radius of the cutting tool into consideration during programming. It makes writing the programme much easier. (2)
- 7.6
- It is much easier to change one or two numbers in the programme than to have to physically remove the tool from the toolpost, and move it to another position. It might also effect the position of some of the other tools already set up correctly. (3)
- 7.7
- 7.7.1 G50 – Set maximum spindle to 1 500
- 7.7.2 G00 – Move the tool rapidly to 5 mm in front of the product M08 – Activate water coolant (2 × 1) (2)

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- 7.8
- There is less risk for slipping on dirty floors or tripping over mislaid tools or cables.
 - Tools, inventory and supplies can be monitored and controlled, and they will be easy to find.
 - Productivity is increased.
 - Space is used more effectively, and machine operators have enough space around them to avoid accidents.
 - Equipment is kept clean and regularly checked for defects. (Any 2 × 1) (2)
- 7.9
- First-off or first-piece inspection
 - During or in-process inspection
 - Last-off, last-piece or final inspection. (3)
- TOTAL : 100**
- [25]**