



# higher education & training

Department:  
Higher Education and Training  
**REPUBLIC OF SOUTH AFRICA**

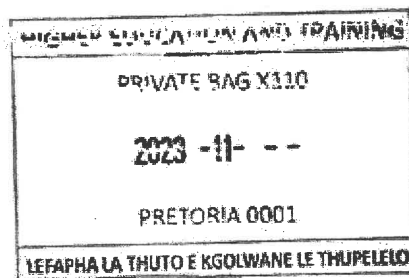
## MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

**FITTING AND TURNING**  
**NQF LEVEL 3**

**27 November 2023**

**This marking guideline consists of 7 pages.**



**Approved 202311 DHET marking**

**Guide. No amendments or additions**

**Must be made on this guide.**



**QUESTION 1**

- 1.1
- Excessive load or too high working speed on the bearing
  - Lack of/Insufficient lubrication/No lubrication
  - Faulty mounting of bearing
  - Poor maintenance
  - Misalignment of shaft and bearing
  - Bearing wrongly designed
  - Grit or dirt on the surfaces
  - Contaminated lubricant
  - Bearing surfaces are uneven
  - Wrong type and grade of lubricant
  - Shaft upon which the bearing is mounted, is not completely round
- (Any 5 × 1) (5)
- 1.2
- A – Rolling-element bearing/Ball bearing/Rolling bearing  
B – Inner race/ring  
C – Cage  
D – Outer race/ring
- (4)
- 1.3
- Bearings and components can be damaged.
  - It may be hazardous.
  - It may be costly.
  - It can lead to unnecessary losses and downtime.
  - It may lead to injury.
  - The bearings may not operate properly.
- (Any 3 × 1) (3)
- 1.4
- Rolling bearings are generally cleaned by using a paintbrush with diesel or paraffin.
  - After cleaning, the bearing and components should be dried and lightly oiled.
- (2)
- 1.5
- The seal cannot be removed
- (1)  
**[15]**



**QUESTION 2**

- 2.1
- Check the alignment of all the components.
  - Check for leakages.
  - Check for signs of wear or looseness in fasteners and re-torque where necessary.
  - Check for unusual noise or excessive temperatures in the system's components.
  - Check that all safety guards or safety devices are in place and operational.
  - Check for excessive vibrations or other indicators of a change in alignment within the system. (Any 3 × 1) (3)
- 2.2
- Reduces noise
  - Reduces vibration
  - Reduces costs of repair and downtime
  - Prolongs equipment's life (4)
- 2.3
- To transmit power from one shaft to another.
  - To align different machines to motors.
  - To connect the drive shaft to the driven shaft.
  - To transmit motion from one shaft to another.
  - To transmit torque from one shaft to another
  - To allow misalignment between two shafts
  - To allow axial movement from one shaft to another (Any 3 × 1) (3)
- [10]**

**QUESTION 3**

- 3.1
- 3.1.1 Spiral claw clutch (1)
- 3.1.2
- A – Sliding/Movable claw
  - B – Spring
  - C – Driven shaft
  - D – Key (feather) (4)
- 3.2
- Noise
  - Shudder
  - Slipping
  - Overheating
  - Non-engagement (Any 3 × 1) (3)
- 3.3
- Defects are noticeable after cleaning.
  - Cleaning forms an integral part of effective maintenance operation. (2)
- [10]**

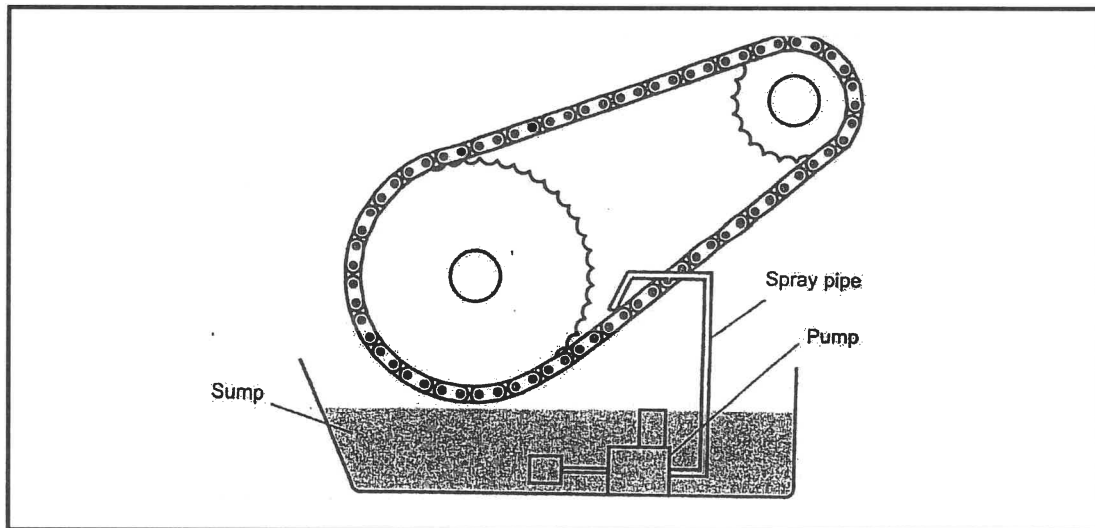


**QUESTION 4**

- 4.1 4.1.1 The drive pulley is the pulley that is fitted to the motor which provides the driving motion by means of a V-belt/flat belt.
- 4.1.2 The driven pulley is attached to the working part of a machine that is driven by the drive pulley using a V-belt/flat belt.
- 4.1.3 An idler pulley keeps the tension of the V-belt/flat belt constant and/or increases the arc of contact.
- 4.1.4 The arc of contact is that portion of the pulley that is in contact with the V-belt/flat belt along its circumference.
- 4.1.5 Centre distance is the distance between the centre of the driving pulley and the centre of the driven pulley.

(5 × 1) (5)

4.2



(Chain and sprocket are also correct labels) (Any 3 labels = 3 marks)  
(Drawing = 2 marks)

(5)

- 4.3
- More efficient
  - Higher speed ratios
  - More compact
  - Longer life span
  - Less likely to break down
  - Less friction resistance occurs
  - Transmits more power directly
  - Radial loads on the bearings of the gear system are low

(Any 5 × 1)

(5)  
**[15]**





**QUESTION 5**

- 5.1
- Bolts and nuts are not tight enough.
  - Flanges do not fit properly together.
  - Sealing devices are damaged.
  - There are corrosion and cracks on the flanges.
  - Damage occurs as a result of vibrations.
  - Flanges are not pulled up evenly. (Any 5 × 1) (5)
- 5.2
- Never attempt to repair any pipeline or valve with which you are not familiar.
  - Remove the pressure relief valve before performing any pressure testing on the system.
  - Never attempt to remove a pressure relief valve from a system that is pressurised.
  - When a valve is under pressure, never place any part of your body near the outlet of the main valve.
  - Before dismantling any valve, double-check that it is completely isolated.
  - Before inspecting or servicing any equipment, perform an approved lock-out/tag-out procedure on an electrical service, a compressed-air supply or any other energy source.
  - Make sure the appropriate safety guards are in place before working on high-pressure valves.
  - Wear personal protective equipment (PPE). (Any 5 × 1) (5)
- [10]**

**QUESTION 6**

- 6.1
- Automatic feed will give you a smooth finish
  - Automatic feed does not chop/chip the work piece
  - Automatic feed will show when the cutting tool is not centred
  - Automatic feed mechanisms provide a consistent and precise feed rate, ensuring uniform and accurate machining of the workpiece
  - Automatic feed allows for continuous machining without the need for constant manual adjustment.
  - Automatic feed reduces the need for operators to be in close proximity to the rotating workpiece, cutting tools, and other potentially hazardous machine components.
- (Any relevant answer) (4 x 1) (4)
- 6.2
- S = 20 m/min  
D = 100 mm = 100/1 000 = 0.1m (Do not penalise student should they not convert to m)  
N = ? r/min
- S =  $\pi \times D \times N$   
N =  $S/\pi \times D$   
=  $20/\pi \times 0,1$  ✓✓  
= 63,662 r/min ✓ (3)



- 6.3
- Never leave the chuck key in the chuck.
  - Wear appropriate personal protective equipment (PPE).
  - Never leave the running machine unattended.
  - Do not make any adjustments while the machine is in motion.
  - Clamp the workpiece securely.
  - Safety guards must always be in place.
  - No fooling around when using a centre lathe. (Any 5 × 1) (5)

- 6.4
- The chuck can hold a wide range of hexagonal and cylindrical workpieces.
  - Jaws are available for internal and external work.
  - Work can be done on the end face of the workpiece. (ADVANTAGES)
  - It is easy to mount the workpiece.
  - Work can become a routine/can be boring/No challenges when the job is being done. (Any 4 × 1) (4)

6.5

PROBLEMS	POSSIBLE CAUSES
• Tool breaks	• Wrong tool material, high feed pressure
• Excessive tool wear	• No cutting fluid used, wrong tool angle, high feed pressure
• Tool chatter (Any 2 × 1)	• Workpiece or tool not clamped securely; tool is blunt (Any 2 × 1)

(4)  
[20]

**QUESTION 7**

- 7.1
- Shape of the workpiece
  - Pressure by the clamp
  - Rigidity of the workpiece
  - Pressure exerted by the milling cutter
  - Ease of locating and removing the clamps (5)

- 7.2
- 7.2.1 Hold or support round workpieces
  - 7.2.2 Secures a workpiece firmly
  - 7.2.3 Holds and supports the workpiece to be machined
  - 7.2.4 Provides clamping support to the workpiece (4)

- 7.3
- Before mounting, clean the dividing head; especially the underside.
  - Clamp directly to table and align.
  - Slide head to correct position and tighten with T-bolts.
  - Mount footstock if required. (4)



- 7.4  $D = 75 \text{ mm} = 75/1000 = 0,075 \text{ m}$  (Do not penalise student if mm is not converted to m)  
 $S = 22 \text{ m/min}$   
 $f_t = 0,08 \text{ mm/tooth}$   
 $T = 8 \text{ teeth}$

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

$$N = S / \pi \times D$$
$$= 22 / \pi \times 0,075 \checkmark \checkmark$$
$$= \underline{93,371 \text{ r/min}} \checkmark$$

$$f = f_t \times T \times N$$
$$= 0,08 \times 8 \times 93,371 \checkmark \checkmark$$
$$= \underline{59,757 \text{ mm/min}} \checkmark$$

(6)

- 7.5 Soluble oil/ Cutting fluid//Cutting water

(1)

**[20]****TOTAL: 100**

