



**higher education  
& training**

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

# **MARKING GUIDELINE**


**NATIONAL CERTIFICATE (VOCATIONAL)**

**FITTING AND TURNING  
NQF LEVEL 3**

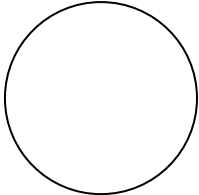
**11 MARCH 2019**

**This marking guideline consists of 6 pages.**

**QUESTION 1: BEARINGS**

- 1.1
- Workers or other people will not slip and injure themselves
  - Core of good housekeeping practice
  - Helps to work safely and efficiently
- (Any 2 × 1) (2)
- 1.2
- Contamination with dirt and foreign matter
  - Abnormal load due to improper assembly
  - Shaft and housing fits are too large or too small
  - Improper lubricant or lubrication method
  - Improper design
  - Incorrect bearing installed
- (Any 5 × 1) (5)
- 1.3
- Induction-heater method
  - Oil-bath method
  - Heating-lamp method
- (3)
- 1.4
- 

Line contact  
(roller bearing)

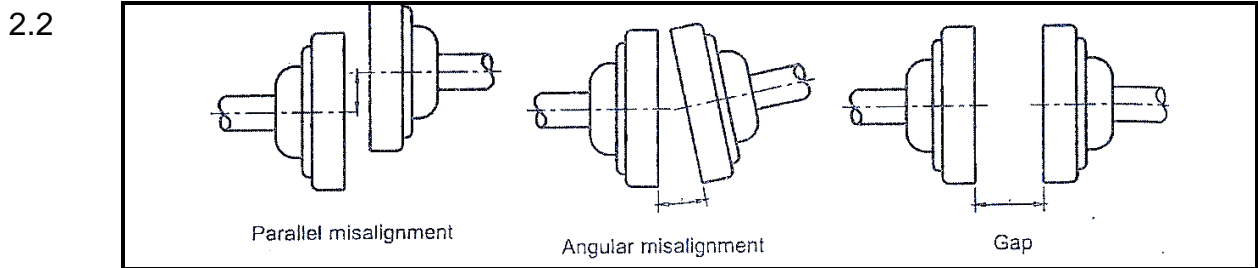


Point contact  
(ball bearing)
- (2 + 2) (4)
- 1.5 To keep rolling elements (balls or rollers) an equal distance apart around the circumference

(1)  
**[15]**

**QUESTION 2: COUPLINGS**

- 2.1
- Rigid/Permanent couplings
  - Flexible couplings
  - Self-aligning couplings
- (3)



(3 × 1) (3)

- 2.3
- Straight-edge and feeler-gauge method
  - Rim-and-face method
  - Reverse-indicator method
  - Laser method
- (4)  
**[10]**

**QUESTION 3: BRAKES AND CLUTCHES**

- 3.1
- The brake applies immediately if there is a power failure (good safety).
  - It is a fast-response system.
- (2)

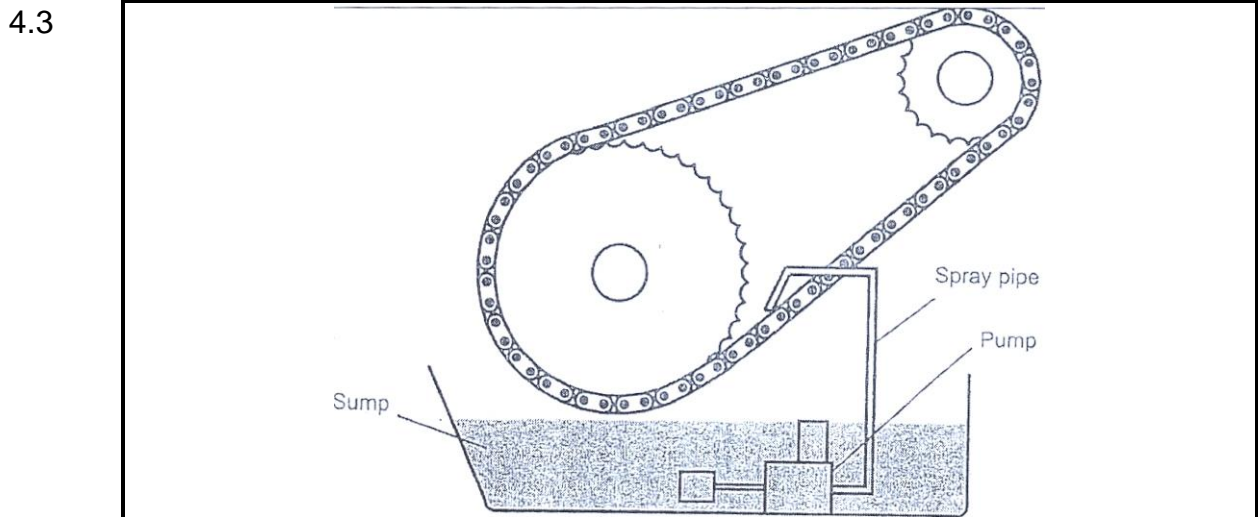
- 3.2
- Noise
  - Shudder
  - Slipping
  - Overheating
  - Nonengagement
- (Any 3 × 1) (3)

- 3.3
- A – Outer cone
  - B – Lining
  - C – Inner cone
  - D – Key
  - E – Shaft
- (5)  
**[10]**

**QUESTION 4: BELT DRIVES, CHAIN DRIVES AND GEAR DRIVES**

- 4.1
- Transmits motion from one shaft to another
  - Drives over a long distance
- (2)

- 4.2
- Prevents accidental contact to the drive
  - Will not fly off and injure the worker when the belt breaks
  - Prevents foreign material from entering the drive
- (3)



(Any relevant drawing)  
(3 for labelling + 2 for drawing) (5)

- 4.4
- Positive drive (no slip)
  - More compact
  - More efficient
  - High speed ratios
  - More durable
- (Any 3 × 1) (3)

- 4.5
- Driven gear can rotate in the same direction as driver gear
  - Varies the distance between the driver and driven gears
- (2)

**[15]**

**QUESTION 5: PIPES, PIPE FITTINGS AND VALVES**

- 5.1
- Bolts and nuts are not tight enough.
  - Flanges do not fit properly to each other.
  - Sealing devices are damaged.
  - There is 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
- Always wear safety clothing (PPE).
  - Appropriate safety guards must be in place.
  - Isolate the valve before inspections and servicing.
  - Depressurise the system.
  - All tools and equipment should be on hand when doing repairs or maintenance.
- (Any relevant 5 × 1) (5)  
**[10]**

**QUESTION 6: CENTRE LATHES**

- 6.1
- a Headstock
  - b Carriage
  - c Tailstock
  - d Tool post
  - e Compound slide
  - f Cross slide
  - g Apron
  - h Feed shaft
  - i Lead screw
- (9 × 1) (9)
- 6.2
- $D = 10 \text{ mm} = 10/1\ 000 = 0,01 \text{ m}$   
 $N = 1\ 800 \text{ r/min}$
- $S = \pi \times D \times N$   
 $= \pi \times 0,01 \times 1\ 800$   
 $= 56,549 \text{ m/min}$
- (3)
- 6.3
- Finish required
  - Type of material
  - Type of tool used
  - Diameter of workpiece
- (4)
- 6.4
- Facing
  - Parallel turning (longitudinal)
  - Grooving or parting off
  - Taper turning
  - Drilling or boring
  - Thread cutting
- (Any 3 × 1) (3)

- 6.5 Shields or guards prevent chips from flying to the operator which can cause injuries and also prevent the chips from flying all over onto the floor. (1)  
**[20]**

**QUESTION 7: MILLING MACHINES**

- 7.1 7.1.1 A roughing cutter is used to remove large amounts of material.
- 7.1.2 An end mill is used for side cutting, slots and flat surfaces.
- 7.1.3 A slot drill is used for plunging operations such as drilling vertically downwards for a certain depth, milling horizontally and also machining a keyway.
- 7.1.4 A T-slot is used for making T-slots in machine tables.
- 7.1.5 A dovetail cutter is used for cutting internal or external dovetails. (5 × 1) (5)
- 7.2
- Wear goggles/Safety glasses.
  - Clamp the workpiece securely.
  - Never leave the machine unattended.
  - Make sure the cutting tool is secured.
  - Do not make any adjustments while the machine is running. (Any 3 × 1) (3)
- 7.3
- Rapid (direct) indexing
  - Simple indexing
  - Angular indexing
  - Differential indexing (4)
- 7.4  $S = \pi \times D \times N$
- $N = S/\pi \times D$   
 $= 10/\pi \times 0,02$   
 $= 159,2 \text{ r/min}$
- $f = f_t \times T \times N$   
 $= 0,04 \times 4 \times 159,2$   
 $= 25,5 \text{ mm/min}$  (6)
- 7.5
- Solid collet
  - Split collet (2)
- [20]**

**TOTAL: 100**