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higher education  
& training

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

# **MARKING GUIDELINE**

**NATIONAL CERTIFICATE (VOCATIONAL)**

**FITTING AND TURNING  
NQF LEVEL 3**

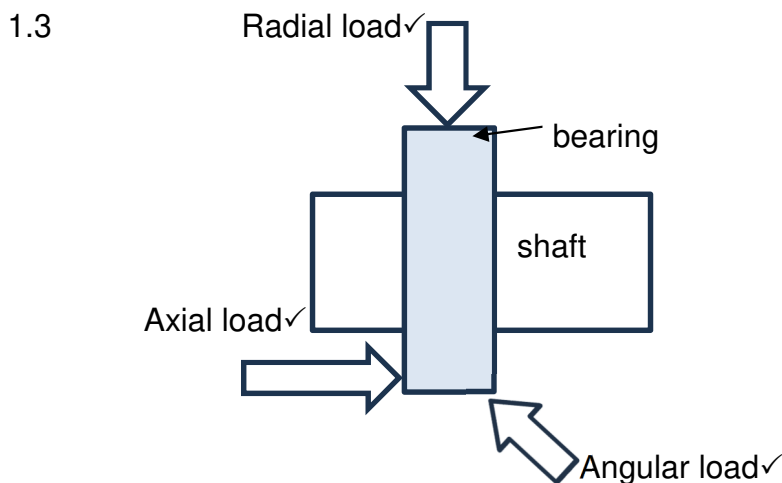
**1 March 2024**

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

**QUESTION 1: BEARINGS**

- 1.1
- Reduces friction
  - Helps the machine to run more efficiently
  - Reduces mechanical breakdown
  - Extends the life of the machinery
  - Reduces abrasive/frictional wear
- (Any 4 × 1) (4)

- 1.2
- Used where starting torques are high
  - Gives a warning by becoming noisy when they begin to fail
  - Can be prepacked and sealed with a lubricant such as grease
  - Can support a combination of both radial and axial loads
  - Lasts longer
  - Generates low friction
  - Easy to replace
  - Requires very little maintenance
  - Maintains high rotational speeds
  - Requires little axial space
- (Any 4 × 1) (4)



(3)

- 1.4
- Flaking of metal on the outer surface
  - Corrosion on all parts of the bearing
  - Wear on the rolling elements
  - Microcracks on the surfaces of the inner and outer races
  - Grooves on the races and rolling elements
  - Burn holes on the races and rolling elements
- (Any 4 × 1) (4)

**[15]**

**QUESTION 2: COUPLINGS**

- 2.1 Angular misalignment: There is angular misalignment when the center lines✓ of two shafts are crossed at an angle✓. The presence of strong axial vibration✓ at a rotational speed characterizes this type of misalignment.

Parallel Misalignment: Parallel misalignment happens when the two shafts to be aligned have center lines parallel✓ to each other, but the center lines are offset.✓✓

(2 × 3) (6)

- 2.2
- Straight edge and feeler gauge method
  - Rim and face method
  - Reverse indicator method
  - Laser method

(4)

**[10]****QUESTION 3: BRAKES AND CLUTCHES**

- 3.1
- 3.1.1 Flywheel
  - 3.1.2 Clutch plate with asbestos lining
  - 3.1.3 Pressure plate
  - 3.1.4 Release bearing
  - 3.1.5 Spring

(5 × 1) (5)

- 3.2
- They can be initially expensive to purchase.
  - They must be manually adjusted for wear.

(2)

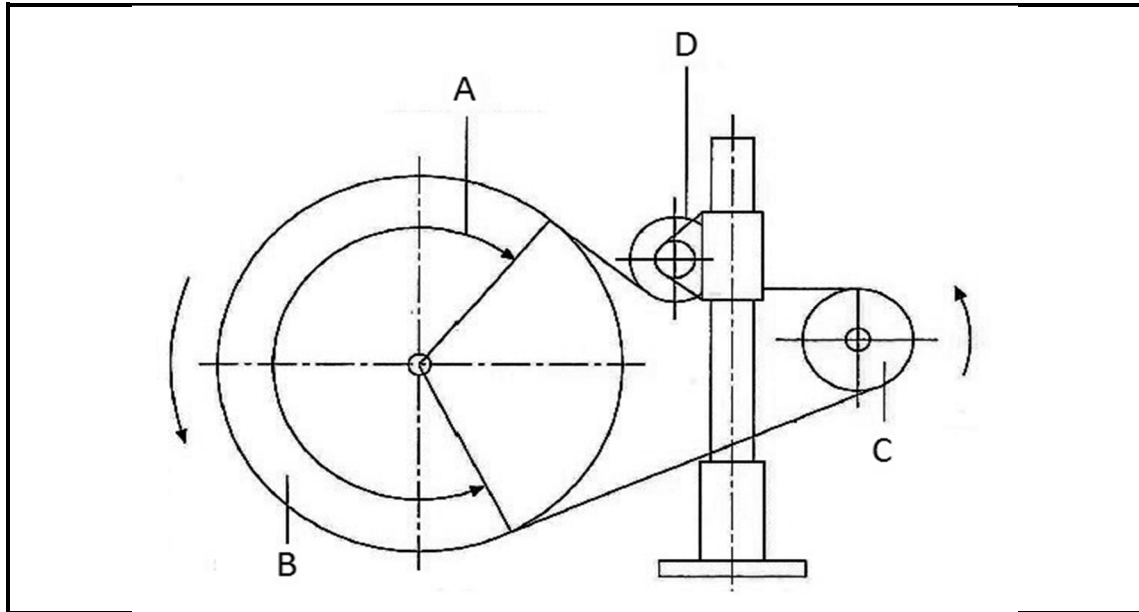
- 3.3
- Electromagnetic brakes
  - Hydraulic brakes
  - Air-operated brakes
  - Mechanical brakes
  - Disc brakes
  - Thruster brakes
  - Drum brakes

(Any 3 × 1) (3)

**[10]**

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

4.1



- A – angle of contact
- B – driven pulley
- C – driver pulley
- D – idler pulley

(4 × 1) (4)

4.2

- Multiple roller chain
- Double-pitch roller chains
- Silent chains
- Leaf chains or lifting chains
- Cranked lift chains
- Conveyor chains

(Any 3 × 1) (3)

4.3

- Manual lubrication
- Drip lubrication
- Disc lubrication
- Oil-bath lubrication
- Oil-stream lubrication

(Any 3 × 1) (3)

4.4

- 4.4.1 False
- 4.4.2 False
- 4.4.3 True
- 4.4.4 False
- 4.4.5 True

(5 × 1) (5)  
**[15]**

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

- 5.1
- Screw-threaded joints
  - Welded joints
  - Butt and strap joints
  - Bell and spigot joints
  - Flanged joints
  - Threaded unions
- (6)
- 5.2
- Controls/Regulates flow
  - Controls volume
  - Controls pressure
  - Controls direction of flow
  - Acts as an on/off device
- (Any 4 × 1) (4)  
**[10]**

**QUESTION 6: CENTRE LATHES**

- 6.1
- In noisy areas use ear protection in the form of ear plugs
  - Long hair should be tied back or secured under a hair net
  - Do not use loose clothing
  - Use safety glasses with side shield
  - Use dust mask or respirator in dusty areas
- (5)
- 6.2
- $D = 50 \text{ mm} = 50/1\ 000 = 0,05 \text{ m}$   
 $S = ? \text{ m/min}$   
 $N = 800 \text{ r/min}$
- $S = \pi \times D \times N$   
 $= \pi \times 0,05 \times 800 \checkmark \checkmark$   
 $= \underline{125,664 \text{ m/min}} \checkmark$
- (3)
- 6.3
- 6.3.1 Facing means to square out the face of the workpiece or to clean the face of the workpiece.
- (1)
- 6.3.2
- Facing stock held in the chuck
  - Facing stock held between centres
- (2)
- 6.4
- HSS cutting tools
  - Brazed tip tools
  - Tip tools
- (Any 2 × 1) (2)

- 6.5
- Facing
  - Parallel turning
  - Taper turning
  - Drilling
  - Boring
  - Grooving
  - Thread cutting
  - Parting off
  - Profile turning
  - Knurling
  - Chamfering
- (Any 5 × 1) (5)
- 6.6 When the machine is switched on, open the tap on the coolant pipe and direct the coolant flow onto the cutting tool and workpiece.✓ The coolant keeps the cutter and the workpiece cool when cutting and washes away the cutting chips/shavings.✓
- (2)  
**[20]**

**QUESTION 7: MILLING MACHINES**

- 7.1
- Workpiece coming loose on the milling machine or clamping device
  - Cutting tools becoming blunt or break during machining
  - Lack of coolant which may cause the cutter or workpiece to overheat
  - Electrical faults
  - Insufficient oil in the machine
- (5)
- 7.2
- Isolate the machine (power off).
  - Remove all tools and equipment from the machine.
  - Use a brush to sweep chips off the machine.
  - Use a soft cloth to wipe away coolant splashes and spills.
  - Apply a thin layer of oil on the machine slides and components.
- (5)
- 7.3
- Solid
  - Split
- (2)

7.4  $D = 50 \text{ mm} = 50/1\,000 = 0,05 \text{ m}$   
 $S = 30 \text{ m/min}$   
 $f_t = 0,06 \text{ mm/tooth}$   
 $T = 6 \text{ teeth}$

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

$$N = S/\pi \times D$$
$$= 30/\pi \times 0,05 \checkmark \checkmark$$
$$= 190,986 \text{ r/min} \checkmark$$

$$f = f_t \times T \times N$$
$$= 0,06 \times 6 \times 190,986 \checkmark \checkmark$$
$$= 68,755 \text{ mm/min} \checkmark$$

(6)

- 7.5
- Micrometers
  - Vernier calipers
  - Dial test indicators

(Any 2 × 1)

(2)

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