higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

# MARKING GUIDELINE

## NATIONAL CERTIFICATE (VOCATIONAL)

## FITTING AND TURNING
## NQF LEVEL 3

## 21 NOVEMBER 2019

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

## QUESTION 1: BEARINGS

1.1
- Plain/Friction/Journal bearings
- Roller/Antifriction bearings (2)

1.2
A Outer race/Outer ring
B Cage
C Rivet
D Rolling element/ball
E Inner race/Inner ring (5)

1.3
- Radial load
- Axial load
- Angular load (3)

1.4
- Easy to replace.
- Used where starting torques are high.
- Become noisy when they are failing.
- Can be pre-packed with grease with seals.
- Can support combination of loads.
- Longer-lasting.
- Generates low friction
- Durable/Long-lasting (Any 2 × 1) (2)

1.5
- Excessive lubrication.
- Lack of lubrication/NO lubrication.
- Faulty mounting of bearing.
- Bearing fitted too tightly in the housing.
- Bearing fitted too tightly onto the shaft.
- Driving belt is too tightly adjusted.
- Grit or dirt on the surfaces. (Any 3 × 1) (3)

**[15]**

## QUESTION 2: COUPLINGS

2.1
- To provide for connections between shafts and motors.
- To provide for easy disconnection for repairs.
- To provide for misalignment of shafts.
- To reduce transmission of shock loads from one shaft to another.
- To protect against overloads.
- To allow for axial movement of shafts.
- To transmit torque. (Any 3 × 1) (3)

2.2
- Rigid/Fixed/Permanent couplings
- Flexible couplings
- Self-aligning couplings (3)

 

2.3
- Excessive noise.
- Excessive vibration.
- Signs of wear.
- Lubricant leakage.
- Looseness of bolts (fasteners).
- Contamination of lubricant due to damaged seals.

(Any relevant answers 4 × 1) (4)
**[10]**

## QUESTION 3: BRAKES AND CLUTCHES

3.1 3.1.1 Electromagnetic brake (1)

3.1.2
A Brake shoe
B Lever
C Electromagnetic solenoid
D Spring
E Shaft (5)

3.2

| CAUSES | REMEDY |
|---|---|
| • Worn linings. | • Replace the clutch unit. |
| • Dirt or oil on the friction surface. | • Clean the surface. |
| • Faulty unit. | • Replace unit. |

(Any 2 × 2 (4)
**[10]**

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

4.1
- It is used to transmit power from a motor to a machine.
- Transmits power connecting the driver and the driven. (Any ONE) (1)

4.2
- Can be used over long distances.
- Less expensive.
- Absorbs shock quite easily.
- Require very little maintenance.
- Easy to assemble and install.
- Silent in operation.
- Overloading causes slip avoiding excessive damage.

(Any relevant answers 5 × 1) (5)

4.3
- Driven gear can rotate in the same direction as the driver gear.
- Distances of gears can be varied. (2)

 

4.4
- Proper guarding must be used.
- Do NOT make any adjustments or repairs while the drive is in motion.
- Isolate the machine when dismantling.
- Ensure chain lubrication at all times.
- Check alignment of shafts and sprockets.
- Check chains for elongation.
- Make sure ALL parts fits in their correct position when assembling.

(Any relevant answers 5 × 1) (5)

4.5
- Gearbox in vehicles
- Differentials
- Lathe drives
- Vehicle drivetrains/transmission (Any applicable answers 2 × 1) (2)

**[15]**

## QUESTION 5: PIPES, PIPE FITTINGS AND VALVES

5.1
- Thermosetting plastic piping
- Thermoplastic piping (2)

5.2
- Quick and easy to install.
- Can be used in small spaces.
- Easy to adjust after installation.
- Easy to disassemble after loosening the nut.
- Fittings are reliable, durable and re-usable. (Any 3 × 1) (3)

5.3
- Controls/Regulates the flow
- Controls volume
- Controls pressure
- Controls direction of flow
- Act as an on/off-device (Any 2 × 1) (2)

5.4
- Gate valve
- Diaphragm valve
- Pressure relief valve
- Butterfly valve
- Ball valve
- Foot valve (Any 3 × 1) (3)

**[10]**

 

## QUESTION 6: CENTRE LATHE

6.1
- Making adjustments while the machine is in motion.
- Workpiece not clamped securely.
- Not wearing goggles/safety glasses.
- Leaving the chuck wrench/key in the chuck.
- Loose clothing/jewellery and long hair which can get caught in the rotating machine.
- Holding shavings with hands (Any other applicable answers 5 × 1) (5)

6.2 D = 50 mm = 50/1 000 = 0,05 m

S = 25 m/min

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

$N = S\pi \times D$
$= 25\pi \times 0,05$✓✓
$= 159,155$ r/min✓

$= 159,155/60$
$= 2,653$ r/s✓ (4)

6.3
- Finish required.
- Type of material being cut.
- Type of tool being used.
- Diameter of the workpiece. (4)

6.4
- Automatic feed saves time.
- Saves labour.
- Finish is better.
- Prevents fatigue when using automatic feed.

(Any relevant answers 4 × 1) (4)

6.5
- Facing
- Parallel turning
- Grooving or parting off
- Taper turning
- Drilling or boring
- Thread cutting (Any 3 × 1) (3)

**[20]**

## QUESTION 7: MILLING MACHINE

7.1
- Lubricate moving parts.
- Check that the machine guards are in place.
- Choose the correct cutter to machine the workpiece.
- Perform a routine maintenance check. (Any relevant answers 4 × 1) (4)

7.2
- Wear goggles/safety glasses.
- Clamp your 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 4 × 1) (4)

7.3
- Reduces friction and wear.
- Washes away chips and filings.
- Keeps the cutting tool and workpiece cool (prevents overheating).
- Provides a better finish on the surface.
- Protects against corrosion.
- Longer life of the cutting tool. (Any 5 × 1) (5)

7.4 D = 25 mm = 0,025 m
S = 45 m/min
T = 4 teeth
ft = 0,18

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

$N = S/\pi \times D$
$= 45/\pi \times 0,025$✓✓
= 572,958 r/min✓

$f = f_t \times T \times N$
$= 0,18 \times 4 \times 572,958$✓✓
= 412,53 mm/min✓ (6)

7.5 Soluble oil (1)
**[20]**

**TOTAL: 100**