higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

FITTING AND TURNING
NQF LEVEL 3

9 MARCH 2018

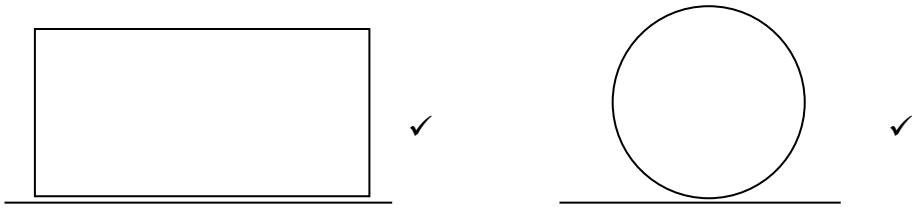
This marking guideline consists of 7 pages.

QUESTION 1: BEARINGS

1.1
- 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)

1.2
- Mounting tube
- Ballpein hammer
- Bearing heater
- Hydraulic press
- Punch (Any 4 × 1) (4)

1.3



Line contact (roller bearing) ✓ Point contact (ball bearing) ✓

(2 + 2) (4)

1.4
- To keep the bearing lubricant from leaking out
- To prevent dirt and other contaminants from entering the bearing

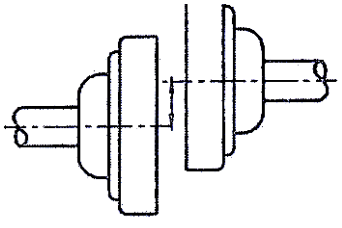
(Any 1 × 1) (1)

[13]

QUESTION 2: COUPLINGS

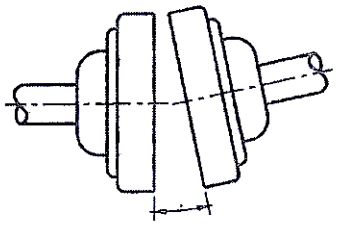
2.1 To join or connect two shafts together for power transmission (cannot be disengaged during operation) (1)

2.2 2.2.1



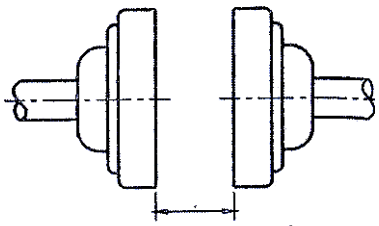
Parallel misalignment

2.2.2



Angular misalignment

2.2.3



Gap

(3 × 1) (3)

2.3
- Misalignment of shafts
- Using the wrong coupling
- Incorrect or inadequate lubrication
- Excessive build-up of dirt may prevent it from adjusting
- Overloading
- Incorrect assembly (Any 4 × 1) (4)

2.4 Motor rock or soft foot occurs when a motor wobbles✓ due to it not standing on an even surface (the same motion one gets when the legs of a table does not have the same length). It is corrected by inserting shim plates✓ under the side that is causing the problem, thus taking up the gap and stops the movement.

(Marks to be allocated only if explanation is correct) (2)

[10]

QUESTION 3: BRAKES AND CLUTCHES

3.1 When there is power, the brakes are deactivated✓ and as soon as there is a power failure, the brakes activate.✓ (2)

3.2
- Fluid leaks
- Worn linings
- Air in the system
- Scoring of the friction surface (metal to metal contact) (Any 3 × 1) (3)

3.3 1 – Pressure plate
2 – Spring
3 – Release bearing
4 – Flywheel
5 – Clutch plate with asbestos lining or clutch plate (5)

[10]

QUESTION 4: BELT DRIVES, CHAIN DRIVES AND GEAR DRIVES

4.1 4.1.1 A drive pulley is fitted to the motor which provides the driving motion.

4.1.2 A driven pulley is attached to the working part of a machine.

4.1.3 An idler pulley keeps the tension of the V-belt constant and/or also 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 along its circumference.

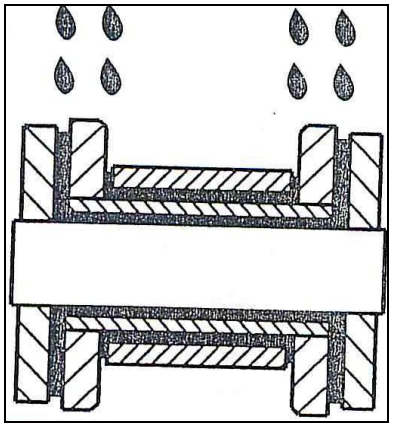
4.1.5 Centre distance is the distance between the centre of the driving pulley and the centre of the driven pulley.

(5 × 1) (5)

4.2
- Solid
- Split
- Idler

(3)

4.3



(Any suitable sketch should be considered) (2)

4.4

ADVANTAGES	DISADVANTAGES
• More efficient • Higher speed ratios • More compact • No slippage	• Expensive • Difficult to repair • Requires constant lubrication

(3 + Any 2) (5)

4.5 4.5.1 Oil level too low (not correct)
4.5.2 Oil level too high causing it to leak from the breather pipe

(2 × 1) (2)

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QUESTION 5: PIPES, PIPE FITTINGS AND VALVES

5.1 A – Outside diameter
B – Inside diameter
C – Wall thickness
D – Pipe length (4)

5.2 5.2.1 Y-piece
5.2.2 Plug
(2 × 1) (2)

5.3
- Gate valve
- Diaphragm valve
- Ball valve
- Foot valve
- Non-return valve
- Pressure relief valve
- Safety valve
- Butterfly valve (Any 4 × 1) (4)

[10]

QUESTION 6: CENTRE LATHE

6.1
- Wearing loose clothing
- Wearing jewellery
- Long hair without a hairnet
- Workpiece not clamped securely
- Not wearing goggles
- Leaving the chuck wrench in the chuck
- Making adjustments while the machine is on or running
- Working on the lathe without proper machine guards or chip shields in place
- Dirty/Wet floor (Any 5 × 1) (5)

6.2 D = 60 mm = 60/1 000 = 0,06 m

S = 30 m/min

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

$N = S/\pi \times D$
$= 30/\pi \times 0,06$✓✓
$=$ <u>159,155 r/min</u>✓ (3)

6.3
- Place a centre in the headstock spindle or tailstock spindle.
- By means of a combined movement between the cross slide and compound slide, move the cutting tool point closer to the centre point.
- Adjust the height of the cutting tool until the cutting tool is at centre height to the centre point (spacers or shim plates may be used).
- Tighten the cam lock handle and check the centre height again.
- Position the tool post correctly and then tighten it to prevent it from moving. (5)

6.4

ADVANTAGES	DISADVANTAGES
• The chuck can hold a wide range of hexagonal and cylindrical workpieces.	• The chuck becomes inaccurate as the jaws become worn.
• Jaws are available for internal and external work.	• The chuck can only hold hexagonal and cylindrical workpieces.
• Work can be done on the end face of the workpiece.	• It is not possible to correct any run out.
• It is easy to mount the workpiece.	• The chuck is heavy to handle.
	• The gripping power of the chuck can damage the workpiece.
	• Concentric accuracy is limited when the workpiece is reversed.

(Any 2 + Any 3) (5)

6.5 The coolant keeps the cutter and the workpiece cool. It also washes away the cutting chips or shavings. (2)

[20]

QUESTION 7: MILLING MACHINE

7.1
- Perform a routine maintenance check (all oil levels, etc.).
- Lubricate the moving parts.
- Check that the machine guards are in place.
- Choose the correct cutter to machine the workpiece. (4)

7.2
- 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)

7.3 Indexing = $\frac{24}{8}$
= 3 holes on a 24-hole circle (2)

7.4 $S = \pi \times D \times N$

$N = S/\pi \times D$
$= 25/\pi \times 0{,}012$✓✓
$= \underline{663{,}146 \text{ r/min}}$✓

$f = fł \times T \times N$
$= 0{,}18 \times 2 \times 663{,}146$✓✓
$= \underline{238{,}732 \text{ mm/min}}$✓ (6)

7.5 It means that the required measurement to which the workpiece may be machined to is not allowed to be above or under the actual size by more than 0,02 mm. (2)

7.6 Bearing seizure (1)
[20]

TOTAL: 100