higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

FITTING AND TURNING
NQF LEVEL 3

XX February 2020

This marking guideline consists of 6 pages.

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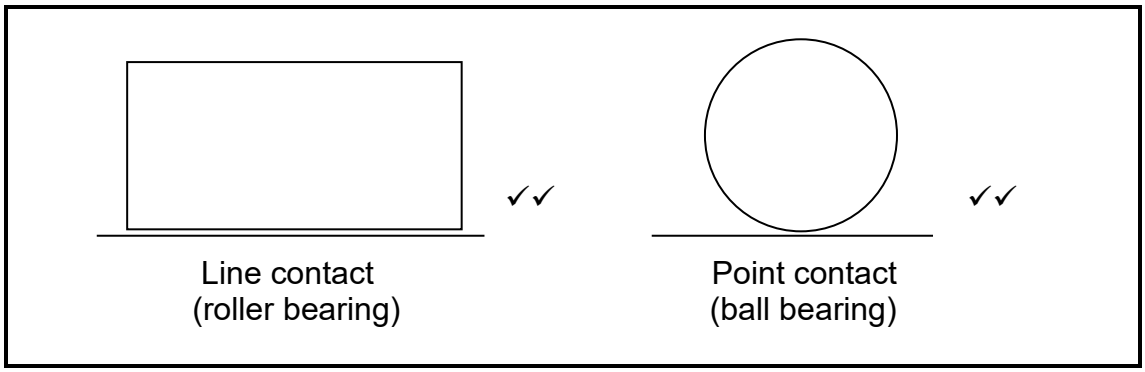
QUESTION 1: BEARINGS

1.1
- Cast iron
- Bronze
- White metal
- Carbon
- Tufnol
- Nylon (Any 3 × 1) (3)

1.2
- Contamination from 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
- Bearings and components could be damaged.
- It may be hazardous.
- It may be costly.
- Can lead to unnecessary losses and downtime.
- May lead to injury.
- Bearing may not operate properly. (Any 3 × 1) (3)

1.4



(2 × 2) (4)
[15]

QUESTION 2: COUPLINGS

2.1 2.1.1 Universal coupling (1)

2.1.2 A – Shaft A
B – Yoke
C – Key
D – Shaft B
E – Cross piece (5)

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
- Air gaps must have the correct space otherwise they will not perform properly.
- Air gaps must have the correct space for cooling purposes and dust not to collect between the friction areas. (2)

3.2
- Hydraulic fluid is below the acceptable level and needs to be checked regularly.
- There may be air in the system. (2)

3.3
- Defects can then be noticeable.
- Cleaning forms an integral part of effective operation. (2)

3.4
- Electromagnetic brakes
- Hydraulic brakes
- Air-operated brakes
- Mechanical brakes
- Disc brakes
- Thruster brakes
- Drum brakes (Any 4 × 1) (4)

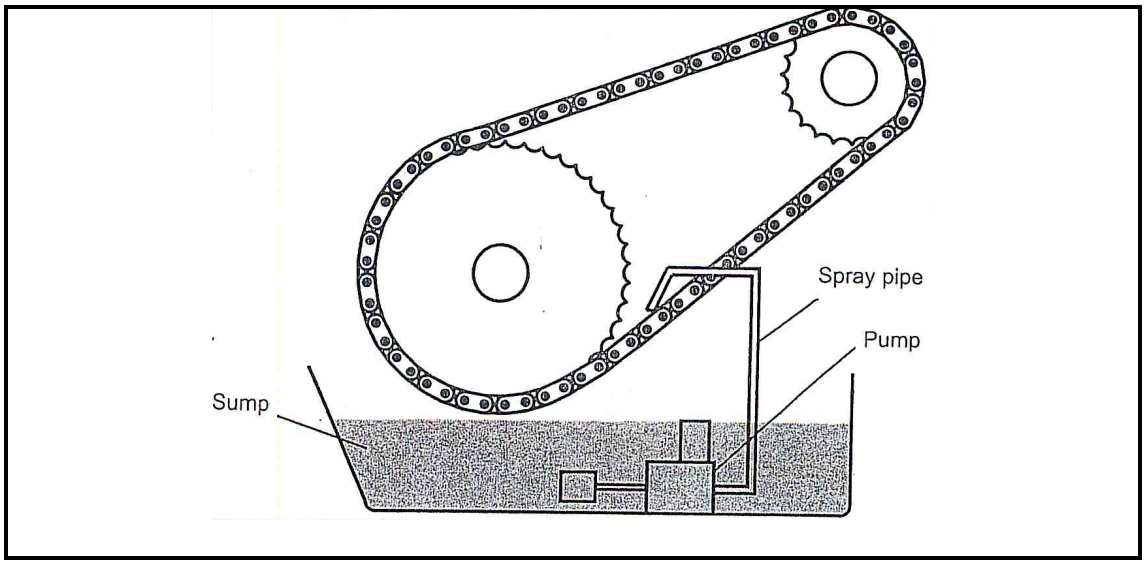
[10]

QUESTION 4: BELT DRIVES, CHAIN DRIVES AND GEAR DRIVES

4.1 A – Arc of contact/contact angle
B – Driven pulley/large pulley
C – Driver pulley/small pulley
D – Idler/jockey/guide pulley (4)

4.2
- Solid
- Split
- Idler (3)

4.3



(Any 3 labels) (3 × 1) (3)
(Drawing) (2)

4.4
- More efficient
- Higher speed ratios
- More compact
- Longer life span/durable
- Less likely to break down
- Less friction resistance occurs (Any 3 × 1) (3)

[15]

QUESTION 5: PIPES, PIPE FITTINGS AND VALVES

5.1
- Bolts and nuts are not tight enough.
- Flanges do not fit properly with one another.
- 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
- Packings
- Seals on the stem
- Valve seat
- Springs
- Gaskets on the inlet, outlet and body of the valve
- Body of the valve (Any 5 × 1) (5)

[10]

QUESTION 6: CENTRE LATHE

6.1

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	Workpiece or tool not clamped securely, tool is blunt

(Any other relevant answer accepted)
(3 problems) (3)
(3 possible causes) (3)

6.2 D = 20 mm = 20/1 000 = 0,02 m
N = 1 500 r/min

S = π × D × N
= π × 0,02 × 1 500✓✓
= 94,248 m/min✓ (3)

6.3

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.	Not possible to correct any run out.
It is easy to mount the workpiece.	The chuck is heavy to handle.
	Gripping power of the chuck can damage the workpiece.
	Concentric accuracy is limited when you reverse the workpiece.

(Any 2 advantages) (2)
(Any 3 disadvantages) (3)

6.4
- Place a solid centre in the headstock spindle or tailstock spindle.
- Move the cutting tool point closer to the solid centre by means of the cross slide.
- Adjust the height of the cutting tool to the solid centre by placing packings under the cutting tool.
- Tighten the cam lock handle and check the centre height again.
- Position the tool post correctly and then tighten for operation. (5)

6.5
- Shields or guards prevent chips that break off to cause injuries to the operator/surrounding persons.
- They also prevent the chips that break off to fall everywhere on the floor.

(Any 1 × 1) (1)
[20]

QUESTION 7: MILLING MACHINE

7.1
- Roughing cutter
- End mill cutter
- Slot drill cutter
- Ball nose cutter
- T–slot cutter
- Dovetail cutter (Any 4 × 1) (4)

7.2
- Wear goggles/safety glasses.
- Clamp the workpiece securely.
- Never leave the machine unattended when switched on.
- Make sure the cutting tool is secured.
- Do not make any adjustments while the machine is running. (Any 4 × 1) (4)

7.3
- Rapid (direct) indexing
- Simple indexing
- Angular indexing
- Differential indexing (4)

7.4 D = 25 mm = 25/1 000 = 0,025
S = 20 m/min
f = 0,05 mm/tooth
T = 4 teeth

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

$N = S/\pi \times D$
$= 20/\pi \times 0,025$✓✓
= <u>254,648 r/min</u>✓

$f = f_t \times T \times N$
$= 0,05 \times 4 \times 254,648$✓✓
= <u>50,93 mm/min</u>✓ (6)

7.5
- File
- Computer (PC)
- USB
- Hard drive (Any 2 × 1) (2)

[20]

TOTAL: 100

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