higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

NOVEMBER EXAMINATION

FITTING AND TURNING
NQF LEVEL 3

1 DECEMBER 2015

This marking guideline consists of 7 pages.

QUESTION 1: BEARINGS

1.1
- Antifriction (rolling) bearings – Single and double direction thrust ball bearings, needle roller bearings, spherical roller, spherical roller bearings, tapered roller bearings, single row angular bearings and singular and double row cylindrical bearings (Any ONE example)
- Friction (plain) bearings – Radial bearings, thrust bearings, guide bearings, solid, split, plumber block, adjustable hanger and tapered bearings. (Any ONE)
- Thrust load bearings – Footstep bearings, multi-collar bearings, single-collar thrust bearings, Mitchell thrust bearings (Any ONE)
- Guide bearings – Guide bearings are used to support movement along a linear path. E.g. The cross slide of a centre lathe and the table of a milling machine. (Any ONE) (2 bearings + 2 examples) (4)

1.2 Adjustable hanging bearing – used to support line shafts in workshops and overhead cranes. (2)

1.3 1.3.1
- A screw puller
- Hydraulic puller
- An impact puller (Any 1 × 1) (1)

1.3.2
- A hydraulic press
- bearing heaters (Any 1 × 1) (1)

1.4 Isolate the equipment from other energy sources:
- electrically
- mechanically (2)

1.5 Visual wear to the shaft.
Measuring the shaft because the bearing seating surface is thought to be worn.
The bearing itself is worn in the case of a solid bearing.
Any indentations or signs of defects on the bearing elements. (Any 2 × 1) (2)
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QUESTION 2: COUPLINGS

2.1 A mechanical device that connects shafts for power transmission (1)

2.2
- Setting the direct gap
- Setting axial alignment
- Setting radial alignment (3)

2.3 2.3.1 Permanent/Fixed coupling

2.3.2 Self-aligning coupling

2.3.3
- Pin type
- Spider
- Tyre
- Raffard
- Laced belt
- Bibby flexible
- Metal disc
- Flange-type couplings (Any 1 x 1)

2.3.4 Flexible coupling

(4 × 1) (4)

2.4
- All bolts have been tightened
- Operate rotational machinery to see if everything works properly
- Safety guards in place, safety devices operational
- Check for unusual noises or excessive temperatures
- Check for excessive vibration or change in alignment
- Check for signs of wear or looseness of fasteners (Any 2 × 1) (2)

2.5 Horisontal split-cover type of bibby flexible coupling (1)

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QUESTION 3: BRAKES AND CLUTCHES

3.1 The air gaps must have the correct space otherwise they will not perform properly if not set to the manufacturer's specifications. (1)

3.2
- The hydraulic oil can be below the acceptable level and needs to be checked regularly.
- There can be air in the system. (2 × 1) (2)

3.3
- You can notice defects during cleaning.
- Cleaning forms an integral part of effective operation. (2)

3.4
- Identity: Multidisc clutch
- Type: Friction clutch (2)

[7]

QUESTION 4: BELT DRIVES, CHAIN DRIVES AND GEAR DRIVES

4.1 It is used to transmit power from a motor to a machine (1)

4.2 Should an overload occur, they will slip, thus avoiding excessive damage.
- They can be used over long center distances.
- They are cheaper than using gear drives.
- They absorb shock quite easily.
- They require very little maintenance.
- Belt drives are easy to assemble and install.
- They operate very well at high or low speeds.
- They are silent in operation. (5 × 1) (5)

4.3
- It is easily to find tools, equipment and spare parts.
- The chances of accidents are less.
- There is less risk of damage to the machine, or dirt contaminating the parts.
- Workers are more productive (4)

4.4 4.4.1 Symptom:
- Excessive chain and sprocket wear
- Broken sprocket teeth
- Excessive noise
- Chain whips
- Broken chain parts (Any 2 × 1) (2)

4.4.2 Fault:
- Misalignment
- Obstruction or foreign material in path of chain
- Too little or excessive slack
- Excessive slack
- Corrosion (Any 2 × 1) (2)

4.4.3 Remedy:
- Check and correct alignment
- Clear foreign materials
- Adjust slack
- Adjust centres
- Increase corrosion protection (Any 2 × 1) (2)

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QUESTION 5: PIPES, PIPE FITTINGS AND VALVES

5.1
- Screw-threaded joint
- Bell and spigot joint
- Flange joint
- Butt and strap joint
- Threaded union joint (5)

5.2
- Damaged gasket
- Flange face is not flat
- Bolt and nuts not torqued to correct specification
- Flanges are cracked or corroded (4)

5.3
- Flange faces meet the required standards
- Gasket seating compression is achieved
- Bolts, nuts and gaskets are free of defects
- Appropriate lubrication is used (4)

5.4
- Controls the direction of the flow
- Controls the pressure in a pipe system
- Controls flow rates in pipes
- Provides an ON/OFF service (Any 1 × 1) (1)

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QUESTION 6: CENTRE LATHES

6.1 Automatic feed saves time as compared to manual feed.
It saves labour. (2)

6.2 Cause: this is caused by the shaft moving away from the tailstock support under pressure.
Rectify: support the shaft with either a fixed steady or travelling steady (2)

6.3
- Power supply
- Hand wheels and feed dials
- Spindle stop and start control
- Speed spindle levers
- Feed engagement levers
- Power feed control
- Automatic feed control
- Cutting fluid supply
- Feed selection (Any 4 × 1) (4)

6.4 6.4.1 $S = \pi DN$

$$N = \frac{S}{\Pi D} \checkmark$$

$$= \frac{25}{\Pi \times 0{,}06} \checkmark$$

$$= \underline{132{,}63 \text{ r/min}} \checkmark$$ (3)

6.4.2 Recommended speed = 125 r/min (1)

6.5 6.5.1 Cause – bearings may be worn

6.5.2 Rectify – replace the bearings
(2 × 1) (2)

6.6 To support the right-hand end of the workpiece (1)

6.7 Tolerance is known as the maximum deviation allowed up or down on machined sizes of work pieces. Tolerances are found on the drawings of the parts to be machined. (1)

6.8 6.8.1 Maximum size = 43,1 mm and minimum size = 42,9 mm

6.8.2 Maximum size = 20,2 mm and minimum size = 19,8 mm
(2 × 2) (4)
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QUESTION 7: MILLING MACHINE

7.1
- The feed rate per tooth
- The number of teeth on the cutter
- The revolutions per minute
- The depth and width of the cutter (Any 3 × 1) (3)

7.2 $S = \Pi DN$

$N = \frac{S}{\Pi D}$ ✓

$= \frac{45}{\Pi \times 0,025}$ ✓

$= \underline{572,96 \text{ r/min}}$ ✓

Feed = ft x N x T
= 0,18 x 572,96 x 4 ✓
= 412,53 mm/min ✓ (5)

7.3 7.3.1 To cut dovetail slides

7.3.2 To cut slots or grooves and keyways

7.3.3 To cut slots, profiles or facing narrow surfaces

7.3.4 To cut keys and blind slots

(4 × 1) (4)

7.4 Cause 1: the cutting depth is too deep
Solution: take smaller cuts

Cause 2: the centrally fitted cutter is not rigid enough during the machining process
Solution: refit the cutter closer to the machine spindle for a more rigid support/provide the overarm with machine bracing arms. (4)

7.5
- He must check his micrometer against the one that is at room temperature.
- He must wait for the micrometer to warm up to room temperature in order to get the correct measurement. (2)

7.6
- File
- Stiffy disk
- USB
- Hard drive (Any 2 × 1) (2)

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TOTAL: 100