



**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

SUPPLEMENTARY EXAMINATION 2013

**FITTING AND TURNING
NQF LEVEL 2**

14 MARCH 2013

This marking guideline consists of 7 pages.

QUESTION 1

- 1.1 1.1.1 D✓
- 1.1.2 A✓
- 1.1.3 E ✓
- 1.1.4 G✓
- 1.1.5 C✓
- 1.1.6 J✓
- 1.1.7 B✓
- 1.1.8 I✓
- 1.1.9 F✓
- 1.1.10 H✓ (10)
- 1.2 • To define the shape. ✓
- To show the exact position of the hole. ✓
- To keep wastage of material to a minimum. ✓
- To allow the fitter and turner to set up the work correctly. ✓
- ANY TWO OF THE ABOVE (2)
- 1.3 • A scribe- to scribe lines on a metal or plastic✓
- A divider- to draw circles and radii on a workpiece. ✓
- A trammel- to draw dig circles. ✓
- A centre punch- to punch the centre for the hole. ✓
- A dotting punch- to mark a line with a series of small dents. ✓
- A jenny calliper- to find the centre of a circle. ✓
- A steel ruler- to mark off specific lengths. ✓
- A tape- to measure lengths. ✓
- A G-clamp - to clamp a workpiece against an angle plate. ✓
- A V-block- to support a round shaft for marking off. ✓
- A surface gauge- to scribe lines parallel to specific surface gauge. ✓
- ANY THREE OF THE ABOVE (3)
- 1.4 • Drive a piece of lead or hardwood into the hole of the flange and coat it with a suitable marking medium. ✓
- Find the centre of the flange with the aid of jenny callipers and coat it with a suitable marking medium. ✓
- Set the divers to a radius of 50 mm and scribe the 100 mm pitch-circle diameter. ✓

- With a steel ruler and a scribe, scribe the line across the face of the flange to pass through the centre. ✓
- Scribe a second line at a right angle to the first line to also pass through the centre. ✓
- Mark the centre point O. ✓
- Divide half of the datum line into four equal parts and add one extra part to the datum line produced from O to A. ✓
- Join A and B and from the centre O, scribe OC parallel to AB to set the position. ✓
- Dot mark the seven centres with a dotting punch. ✓
- Set the dividers to the radius of the required size holes and scribe the seven circles. ✓
- Dot mark four dots on the outside of each circle with a dotting punch. ✓

ANY THREE OF THE ABOVE

(3)
[18]

QUESTION 2:

- 2.1
1. Overall length ✓
 2. Shank ✓
 3. Body ✓
 4. Heel ✓
 5. Hand ✓
 6. Body clearance ✓
 7. Flute ✓
- (7)
- 2.2
- Study and interpret the instructions of the job and on the engineering drawings. ✓
 - Inspect the work area. ✓
 - Work out the calculations. ✓
 - Fit the drill bit. ✓
 - Select the drill speed. ✓
 - Clamp the workpiece. ✓
 - Do the drilling. ✓
- ANY FIVE OF THE ABOVE (5)
- 2.3
- If the machined workpiece matched the specifications in the engineering drawings and job card. ✓
 - The drill bit that you used. ✓
 - Any problems that you experienced while drilling. ✓
 - If you completed a quality check on the workpiece and measuring instruments that you used. ✓
 - If any malfunctions happened during the drilling process. ✓
- (5)
[17]

QUESTION 3

- 3.1
- The vertical milling machine√
 - Drills holes in workpieces. √
 - Machines flat surfaces on metal plates. √
 - Cuts slots and keyways on solid round shafts.√
 - Bores jigs and templates to use for making large quantities of components.√
- (2)

- The plain horizontal milling machine√
 - Cuts slots into workpieces. √
 - Cuts spur gears with straight teeth. √
 - Does gang milling.
- (2)

- The universal milling machine√
 - Does helical milling√
 - Cutting spiral flutes on a drill bit. √
 - Cutting spline shafts. √

ANY ONE OF THE ABOVE USES FOR EACH ONE (2)

3.2

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

$$N = 28/\pi \times 0,14$$

$$= 63,662 \text{ r/min}$$

$$f = f_t \times T \times N$$

$$= 0,051 \times 24 \times 63,662$$

$$= 77,922 \text{ N}$$

(5)

- 3.3
- If the machine starts to make strange noises, the bearings of the spindle may be worn. √
 - If the machine table vibrates, the machine slides are worn. √
 - If the spindle heats up, the oil seals are leaking and the spindle bearings are dry, which causes friction between the revolving spindle and surface of the bearing. √
- (3)

- 3.4
- Telescopic gauge√
 - Vernier calliper√
 - Inside micrometer√
- (3)

[17]

QUESTION 4

- 4.1
- Check the engineering drawing and the job card. ✓
 - Check the tools and equipment. ✓
 - Check the condition of the surface-grinding machine. ✓
 - Practise workshop safety. ✓
- (4)
- 4.2
- A. Wheel ✓
 - B. Washer ✓
 - C. Spindle nut ✓
 - D. Outer flange ✓
 - E. Inner flange ✓
 - F. Spindle ✓
- (6)
- 4.3
- 4.3.1 True ✓
- 4.3.2 False ✓
- 4.3.3 True ✓
- 4.3.4 False ✓
- 4.3.5 False ✓
- (5)
- 4.4
- If the wheel is not heavy, you can suspend it from the hole on a screwdriver handle or on your finger. ✓
 - Place heavier wheels upright on a clean, hard floor. ✓
 - Tap the wheel gently with a non-metal tool such as a wooden screwdriver handle for light wheels and ✓
 - A wooden mallet for heavy wheels. ✓
 - The best spot to tap a wheel for the ring test is about 45 mm on either side of a line drawn upright through the centre and about 25 mm to 50 mm from the outside edge, depending on the size. ✓
 - Rotate a wheel after 45°, tap it and listen to the sound. If it makes a muffled sound it has cracks. ✓
- ANY FIVE OF THE ABOVE (5)
[20]

QUESTION 5

- 5.1
1. Driving plate ✓
 2. Driving pin ✓
 3. Carrier ✓
 4. Lathe tailstock ✓
 5. Workpiece ✓
- (5)

$$\begin{aligned}
 5.2 \quad S &= \pi \times D \times N \\
 N &= \frac{S}{\pi} \times D \\
 &= 0,398 \text{ r/min}
 \end{aligned}
 \tag{3}$$

$$\begin{aligned}
 5.3 \quad S &= 15 \text{ m/min} \\
 &= 15/60 \text{ m/sec} \\
 &= 0,25 \text{ m/sec} \checkmark \\
 \\
 D &= 60 \text{ mm} \\
 S &= \pi D N/60 \checkmark \\
 N &= S \times 60/\pi \times D \checkmark \\
 &= 0,25 \times 60/\pi \times 0,06 \checkmark \\
 &= 79,787 \text{ r/min} \checkmark \\
 \\
 T &= L/f \times N \\
 &= 340 \text{ mm}/0,15 \times 79,787 \checkmark \\
 &= 28,409 \text{ minutes} \checkmark \\
 &= 28 \text{ minutes } 24 \text{ seconds} \checkmark
 \end{aligned}
 \tag{5}$$

- 5.4
- Turn the lever on the apron that controls the automatic feed of the carriage to engage the feed. \checkmark
 - The carriage is now moving along the length of the workpiece. \checkmark
 - The cutting tool machines the outside diameter of the workpiece to the required length at the same time. \checkmark
- (3)

- 5.5
- If the machined workpiece matched the specifications in the engineering drawings and job card. \checkmark
 - The cutters that you used. \checkmark
 - Any problems that you experienced during machining. \checkmark
 - If you completed a quality check on the workpiece and checked the measuring instruments that you used. \checkmark
 - If any malfunctions happened on the milling machine during the machining process. \checkmark

ANY TWO OF THE ABOVE (2)
[18]

QUESTION 6

- 6.1
- A welding hood \checkmark
 - Leather gloves \checkmark
 - A leather apron \checkmark
 - Leather shoes/spats \checkmark
- (4)

- 6.2
- The welding methods that you used ✓
 - The base material ✓
 - The filler material ✓
 - The flux material ✓
 - The design of the joint ✓
- ANY FOUR OF THE ABOVE (4)
- 6.3
- Check if there is enough light. ✓
 - Check if you have enough space. ✓
 - Check if you have enough ventilation. ✓
 - Check if the floor is dry. ✓
- ANY TWO OF THE ABOVE (2)
- [10]**
- TOTAL: 100**