higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

# MARKING GUIDELINE

## NATIONAL CERTIFICATE

## TOOLMAKERS' THEORY N2

## 1 AUGUST 2018

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

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## QUESTION 1: OCCUPATIONAL SAFETY

1.1
- Check the cable and plug for loose wires.
- Fasten the drill in the chuck with a chuck key.
- Put the switch lock on the drill operation you want to use.
- Put the switch lock on the correct speed for the type of drilling work.
- Hold the drill steady while drilling.
- Hold one hand on the handle and the other hand on the drill while drilling.

(Any 2 × 1) (2)

1.2
A Jaw
B Housing
C Switch lock
D Handle
E Cable with three-point plug
F Chuck key (6)

1.3 Red = Life wire
Blue = Neutral wire
Black = Earth wire (3)
**[11]**

## QUESTION 2: STEEL AND TOOL STEEL

2.1
2.1.1 True
2.1.2 True
2.1.3 False
2.1.4 False
2.1.5 True

(5 × 1) (5)

2.2 Silver Steel = Carbon 1,1 % - 1,25 %
Manganese 0,2 % - 0,4 %
Chromium 0,5 % - 0,8 %
Silicon 0,15 % - 0,3 %
Vanadium 0,.07 % - 0,12 % (5)

2.3 It is a tool steel with the useful property that it does not deform or lose its dimensions during heat treatment. (2)
**[12]**

## QUESTION 3: HEAT TREATMENT AND HARDNESS TESTING

3.1 *Quenching* is the cooling of a work piece during hardening processes. (1)

3.2 Carbon (1)

3.3 According to the chemical and physical relationship between the two elements, iron and carbon. (2)

3.4 Chromium, nickel and manganese promote the relationship between the two elements iron and carbon in steel. (2)

3.5 To seal the steel box and keep the oxygen out (2)

3.6
- Rapid test (usually less than 10 seconds)
- Direct readout, no questionable optical measurements required
- Non-destructive; parts can be used normally (3)

**[11]**

## QUESTION 4: LIMITS AND FITS

4.1
A Tolerance of hole
B Tolerance of shaft
C Minimum clearance
D Maximum clearance (4)

4.2
- The nominal size
- The class of fit required
- The quality of the product (3)

4.3
- 55 = 55 mm, the nominal size
- H = tolerance of the hole and 6 = grade of tolerance of hole
- f = tolerance of the shaft and 4 = grade of tolerance of shaft (3)

4.4
4.4.1 Clearance fit
4.4.2 Transition fit
4.4.3 Interference fit
4.4.4 Clearance fit
4.4.5 Clearance fit

(5 × 1) (5)

**[15]**

## QUESTION 5: PRECISION MEASURING

5.1 Wear blocks are wrung to the ends of a stack of gauge blocks to provide protection against wear. (2)

5.2 A sine bar is a hardened and ground steel bar or rectangular section having a hardened precision ground roller fitted to each end. (2)

5.3 They are the same size. (1)

5.4

69,3475
- 1,0075 ✓
68,34
- 1,04 ✓
67,3
- 1,3 ✓
66,0
- 50,0 ✓
16,0
- 16,0 ✓
0,.0 (5)

5.5
1 Scriber point
2 Holder
3 Gauge blocks
4 Base (4)

**[14]**

## QUESTION 6: GAUGES

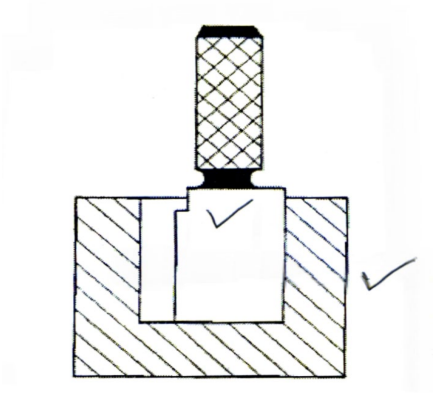
6.1 Gauges are used to check the dimensions or shape of a machined part. (1)

6.2 Plug gauges are normally used to check holes. (1)

6.3
- Working gauge
- Inspection gauge
- Master or reference gauge (3)

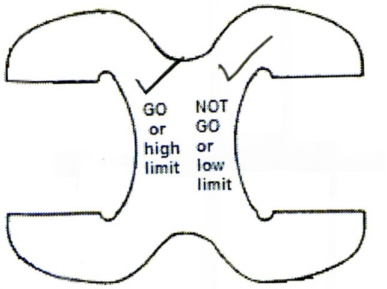
6.4 When gauging into a blind hole, the flat allows air to escape. (1)

6.5



(2)

6.6

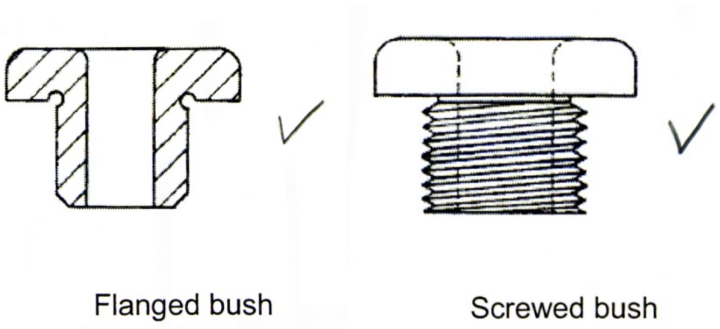



(2)
**[10]**

## QUESTION 7: JIGS AND FIXTURES

7.1
- Parts will be interchangeable.
- Save time as no marking out has to be done.
- Semi-skilled labour can be employed.
- Increase production.
- Reduces physical fatigue of the operator.
- Reduce time in setting of machines and clamping of work-pieces.
- General machines unsuitable for carrying out certain specific operations can be used. (Any 6 × 1) (6)

7.2




(2)
**[8]**

## QUESTION 8: CUTTING TOOLS

8.1
- Turning
- Drilling
- Profiling
- Shaping
- Slotting (5)

8.2
- Carbide is used because it has a very low tensile strength.
- The tensile strength of tungsten carbide is only about half that of high-speed steel.
- Tungsten carbide retains its cutting edge at a high temperature.
- Tungsten carbide can be used at high cutting speeds. (Any 3 × 1) (3)

**[8]**

## QUESTION 9: DRILLS AND REAMERS

9.1 Quick spiral drills (1)

9.2 Slow spiral drills (1)

9.3
- The flutes help with swifter ejection of shavings.
- The flutes prevent the shavings from packing inside, which lead to drill breakage. (Any ONE) (1)

9.4
- Two edges formed by the flutes.
- Tool-point formed by the material between the flutes. (2)

9.5 A reamer is used to enlarge and finish holes to accurate dimensions. (1)

**[6]**

## QUESTION: SINKING AND FORGING

10.1
- The forging size and the material to be forged.
- The direction in which the component is to be forged.
- If the blank material is to be pre-formed or not before the final forging steps.
- The quantity of components to be produced. (4)

10.2 Materials that should have wear resistant and shock resistant properties to prolong life and reduce cracking. (1)

**[5]**

**TOTAL: 100**

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