higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

TOOLMAKERS' THEORY N2

8 AUGUST 2019

This marking guideline consists of 6 pages.

Copyright reserved

QUESTION 1: OCCUPATIONAL SAFETY

1.1
- To protect the body against accidents and danger
- Regulation of the Health and Safety Act (Any ONE) (1)

1.2 Safety goggles or spectacles. (1)

1.3 To protect the workers against contact with moving parts of machines (1)

1.4 1 m or 1 100 mm (1)

1.5
1.5.1 False
1.5.2 False
1.5.3 True
1.5.4 False
(4 × 1) (4)
[8]

QUESTION 2: STEELS AND TOOL STEELS

2.1
- Mild steel – 0,3%
- Medium-carbon steel – 0,3%–0,8%
- High-carbon steel – 0,8%–0,15% (3)

2.2
- Tungsten
- Molybdenum
- Nickel
- Chromium
- Vanadium
- Manganese (6)

2.3
- Punches
- Lathe centres
- Broaches
- Chuck jaws (3)

[12]

QUESTION 3: HEAT TREATMENT AND HARDNESS TESTING

3.1
- Rockwell test
- Superficial Rockwell test (2)

3.2
- Minimum load = 10 kg
- Maximum load = 150 kg (2)

3.3
- Minimum load = 3 kg
- Maximum load = 45 kg (2)

3.4
- Multiple test scales are needed to cover the full range of metal hardness.
- Conversions between scales can be material dependant.
- Samples must be clean and have a smooth test point to get good results. (3)

[9]

QUESTION 4: LIMITS AND FITS

4.1
A – Hole maximum limit
B – Hole minimum limit
C – Hole tolerance
D – Basic size
E – Zero line
F – Shaft tolerance
G – Shaft minimum limit
H – Shaft maximum limit

(8 × 1) (8)

4.2 4.2.1 Difference between the hole maximum and hole minimum sizes

4.2.2 Difference between the shaft maximum and shaft minimum sizes

(2 × 1) (2)

[10]

QUESTION 5: PRECISION MEASURING

5.1
- Use at a temperature of 20 °C.
- Don't handle gauge blocks with bare hands.
- Clean blocks with linen cloth before wringing them together.
- Work over a surface covered with soft timber.
- Protect outer surface of pack with wear blocks.
- Never leave gauges wrung together.
- Clean blocks after use.
- Replace in box after use. (Any 6 × 1) (6)

5.2
```
  69.3475
-  1.0075 ---------- 1
  68.340
-  1.04 ---------- 2
  67.30
-  1.30 ---------- 3
  66.00
- 50.00 ---------- 4
  16.00
- 16.00 ---------- 5
  00.00
```
(5)
[11]

QUESTION 6: GAUGES

6.1
- Requires little skill
- Quicker to use than measuring instruments
- Time saved increase production
- Eliminates the use of expensive measuring instruments (4)

6.2
- The 'go' side must be easily distinguished from the 'not go' side.
- Checking surfaces must be sufficiently hard to resist wear.
- Checking surfaces of plug gauges should be as long as possible to prevent jamming and minimise wear. (3)

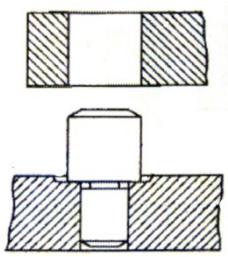
6.3 If the 'go' side is too short, alignment of the bore cannot be checked. (1)

6.4 To allow air to escape when a hole size is checked (1)

6.5 To check holes (1)
[10]

Copyright reserved

QUESTION 7: JIGS AND FIXTURES

7.1  ✓✓✓ (3)

7.2
- Linear or master bush
- Headless bush
- Screwed bush
- Flange bush (4)

7.3
- Fixed type
- Slip type (2)

7.4
- To drill a hole in a pipe flange or shaft coupling
- To drill a hole through the end of a shaft (2)

[11]

QUESTION 8: CEMENTED CARBIDE CUTTING AND TIP TOOLS

8.1 A – Straight rough chisel or tool
B – Right chisel or radius tool
C – Left chisel or radius tool
D – Right-blade chisel or tool
E – Left-blade chisel or tool
F – Parting tool
G – Wire cutting chisel or threading tool
H – Profile chisel or tool
I – Profile chisel or tool (9)

8.2 Tungsten carbide (1)

[10]

QUESTION 9: DRILLS AND REAMERS

9.1 A – Drill axis
B – Flute
C – Heel
D – Land
E – Body clearance
F – Shank
G – Body (7)

9.2 To cool off the drill with water or cutting flued while drilling (1)

9.3
- Straight shank drills
- Taper shank drills (2)

[10]

QUESTION 10: DIE-SINKING AND FORGING

10.1 Forming of components by heating steel to its correct temperature and then hammering, stamping or pressing it until the required shape is formed. (2)

10.2
- Forging size and material to be forged
- Direction in which component is to be forged
- Blank material is to be preformed or not before the final forging steps
- Quantity of components to be produced (4)

10.3
- Wear-resisting
- Shock-resisting
- Able to reduce cracking (3)

[9]

TOTAL: 100

Copyright reserved