higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

METAL WORKERS' THEORY N1

5 APRIL 2018

This marking guideline consists of 5 pages.

QUESTION 1

- Safety goggles
- Safety shoes
- Hard hat
- Ear guards and ear plugs
- Heavy duty leather gloves **[5]**

QUESTION 2

2.1
- Pin or prick punch
- Centre punch
- Sleeve punch (3)

2.2
- Hand file
- Flat file
- Square file
- Round file
- Half-round file
- Triangular file (Any 5 × 1) (5)

2.3 2.3.1 It is used to measure the lengths of curved or irregular surfaces such as the circumference of a large tank.

2.3.2 It is used to mark the centres of the hole before it is centre punched.

2.3.3 They are used to draw large circles or arcs of a circle.

2.3.4 It is used to mark off bevels or mitres on steel sections.

2.3.5 It is used to scribe a permanent mark or groove into a mild-steel plate.

(5 × 1) (5)

2.4 $R^2 = X^2 + Y^2$ (2)
[15]

QUESTION 3

- Dotted lines to indicate hidden details.
- Bold lines to show the outline of a drawing.
- Centre lines to indicate the centre of the drawing.
- Short chain lines to show portions which have been cut away.
- Construction lines are the feint lines not seen in the drawing. (5 × 2) **[10]**

QUESTION 4

4.1 4.1.1 It refers to the ability of metal to return to its original shape after being stretched, bent, compressed or deformed. (3)

4.1.2 It is the ability of metal that allows it to absorb impact or hammering loads without breaking or cracking. (2)

4.1.3 This metal can be hammered into shape without cracking. (2)

4.2 4.2.1 Mild-steel plate
4.2.2 Other side up
4.2.3 Countersunk
4.2.4 Galvanised
4.2.5 Revolutions per minute

(5 × 1) (5)
[12]

QUESTION 5

5.1
- Ensure that the area around the bending press is clear.
- Make sure that there are no hands or fingers in the way before operating the press.
- Do not hold or grip the plate to be bent as the plunger of the press will cause the plate to jerk when it comes down onto the bent line.
- Do not overload the machine by trying to bend plates thicker than the capacity of the bending machine.
- Take note of the position of the emergency stop button or switch.
- Make sure that all guards are in position and operating correctly before using the machine. (Any 5 × 1) (5)

5.2
- Ensure that the steel section to be cut is firmly secured before starting the machine.
- Keep the area around the machine clean and tidy at all times.
- Make sure that the cutting speed of the machine is correct before starting the cut.
- Wear suitable clothing for a workshop.
- Do not leave the machine unattended at any time during the operation time. (5 × 1) (5)

[10]

QUESTION 6

6.1
- Conical head
- Cup or snap head
- Pan head
- Countersunk head (Any 3 × 1) (3)

6.2 6.2.1 Pitch is the distance measured from the centre of one hole to the centre of the next hole along a straight line.

6.2.2 Landing is the distance measured from the edge of the plate to the centre of the hole.

(2 × 1) (2)

6.3 6.3.1 It is used in general assembly work where less stress is experienced. (2)

6.3.2 They are used in a very small tolerance, only 0,127 mm larger than the diameter of the bolt, with maximum tolerance of 0,397 mm. (3)

[10]

QUESTION 7

7.1 To test for gas leak in rubber hoses, copper or steel tubing, a mixture of soft soap in water must be used. Mix the soft soap thoroughly and then apply the mixture to the tubing or hose joints with a paintbrush. If there is a leak, the soapy mixture will form bubbles which will identify the leak. (5)

7.2
- Overalls for body protection
- Leather apron to protect the body against ultraviolet rays and arc rays
- Safety boots to protect feet against heavy falling objects
- Leather spats for feet protection
- Leather gloves for hand protection
- Leather yoke to protect the back and shoulders from sparks and hot globular metals (Any 5 × 2) (10)

[15]

QUESTION 8

8.1
- Check that all electrical connections are secure and that the machine has a proper earth connection.
- Check that the welding cables are in good repair – worn or defective cables must be replaced.
- Ensure that the electrode holder and the earth clamp are in good condition.
- Make sure that all cable connections are secure and properly insulated.
- Have a fire extinguisher within easy reach.
- Wear goggles when chipping slag from the weld.
- Make sure that the welding cables are kept clear of walkways during welding. (Any 5 × 1) (5)

8.2
- The generator is complex and has many moving parts which will cause wear.
- Maintenance costs are much higher on the generator than on the transformer.
- The generator is considerably more expensive than a transformer producing comparable welding current.
- Above 200 amperes the magnetic effect of the electric arc created by the direct current causes the arc-blow.
- The generator creates a fairly high noise level. (5)

8.3 Direct-current straight polarity is the term used when the electrode holder is connected to the negative pole of the direct-current welding generator. The metal being welded is connected to the positive pole, by means of an earth clamp, to the job being welded. When the arc is struck the electrons flow from the negative electrode to the positive work. As 70% of the heat is concentrated in the positive side of the electron flow much more heat is generated on the work being welded when using DCSP. (5)
[15]

QUESTION 9

9.1 The length required to form the internal stiffening ring:

Mean diameter = 840 mm – 10 mm

= 830 mm

Circumference = 830 mm × 3,142

= 2 607,86 mm

9.2 The length required to form external stiffening ring:

Mean diameter = 840 mm + 20 mm +10 mm

= 870 mm

Circumference = 870 mm × 3,142

= 2 733,54 mm

(2 × 4) **[8]**

TOTAL: 100