higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

PLATERS' THEORY N2

6 APRIL 2018

This marking guideline consists of 7 pages.

QUESTION 1: MACHINES AND SAFETY

1.1

UNSAFE ACT	UNSAFE CONDITION
1.1.3 Machining an unclamped workpiece	1.1.1 Bad factory layout and badly marked walkways
1.1.2 Leaving a machine running unattended	1.1.4 Crowded workshop

(4 × 1/2) (2)

1.2
- It serves as a warning signof possible danger regarding machines, equipment and in the workshop.
- It helps to identify and distinguish substances,demarcations, equipment,machines, etc.

(2 x 1) (2)

1.3 1.3.1 Signal red
1.3.2 Golden brown

(2 × 1) (2)

1.4 Interlocking guards are powered guards which prevent machinesto operatewhen the guards are not in position, thus preventing operators from getting their hands caught in the machines. (2)

1.5 1.5.1
- Keep hands clear of the fastener and tool nose when the machine is operating.
- Be careful not to get hands caught between the tool and any obstruction.
- Do not use machines if their pintail deflectors are removed or damaged.
- Beware of premature pin breakage caused by worn or faulty machines or hard collars.
- Regularly examine the machine,air hose and all the fittings.

(Any 1 x 1) (1)

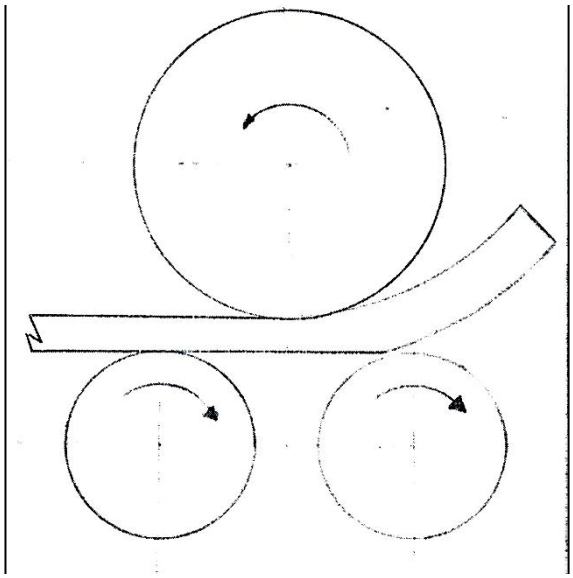
1.5.2
- Do not make any adjustments while it is in operation.
- Wear safety gloves to protect hands against the sharp edges of plates.
- Keep fingers away from the stripper.
- Only one person may operate the machine at a time.
- Make sure that the workpiece is held secure during punching.

(Any 1 x 1) (1)
[10]

QUESTION 2: ROLLING, BENDING AND STRAIGHTENING MACHINE

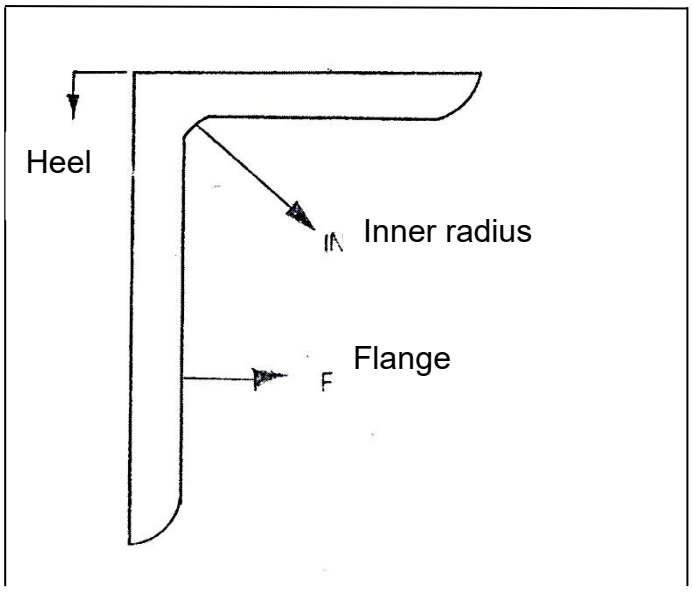
2.1 A hammer and anvil are used to hit the ends of a plate to the correct radius, about 100 mm, prior to inserting it into the machine. (2)

2.2 The top bigger roller is positioned centrally between two lower equal fixed rollers. The prepared metal plate will then inserted between the upper and lower rollers where the upper roller will be adjusted up and down until the correct curvature is obtained. The rest of the plate can now be entirely rolled into a cylinder



PYRAMIDAL ROLLERS (4)

2.3



UNEQUAL-LEG ANGLE IRON (4)

[10]

QUESTION 3: JOINING OF STEEL PROFILES

3.1 Joining of steel profiles helps to strengthen a structure and toobtain the required size of a structure. (2)

3.2 An assembly jig is used so that the number of identical parts can be produced without repeating measurements. (2)

3.3 Permanent joint means the joining of metalin such a way that the partscannot be separated without damaging them. (2)

3.4
- An assembly jig is used to produce a number of identical parts without repeating measurements.
- A holding device is used to hold objectsso that different tasks of measurement can be carried out. (2 × 2) (4)

[10]

QUESTION 4: GENERAL PIPEWORK

4.1 4.1.1 A pipefitter's square is used for checking and measuring pipe alignment of 90^{o} or 45^{o}.

4.1.2 A pipe contour-maker is used to check the roundness/shapeof a pipe hole.

4.1.3 It is used to gradually reduce the pipe size from a bigger to a smaller diameter.

4.1.4 It is welded to the end of a pipe so that another pipe of the same diameter can be joined to it by bolting.

(4 × 1) (4)

4.2 4.2.1

$$\cos 30 = \frac{\text{advance}}{\text{travel}}$$

$$\text{advance} = \text{travel} \times \cos 30°$$

$$= 800 \cos 30°$$

$$= 692{,}82 \text{ mm}$$

4.2.2

$$\sin 30 = \frac{\text{offset}}{\text{travel}}$$

$$\text{offset} = 800\sin 30°$$

$$= 400 \text{ mm}$$

or

$$\text{TRAVEL}^2 = \text{ADVANCE}^2 + \text{OFFSET}^2$$

$$\text{OFFSET} = \sqrt{\text{TRAVEL}^2 - \text{ADVANCE}^2}$$

$$= \sqrt{800^2 - 692.82^2}$$

$$= 400 \text{ mm}$$

(2 × 3) (6)
[10]

QUESTION 5: ROOF TRUSS

5.1 5.1.1 A strut is the pushing/compression tendency of a member.

5.1.2 A gusset is a piece of shaped metal used to firmly hold different truss members acting at the same point.

(2 × 2) (4)

5.2

$$\text{Tan}\theta = \frac{4}{5}$$

$$\theta = \text{Tan}^{-1}\frac{4}{5}$$

$$\theta = 36{,}65°$$

(2)

5.3
- Angle which is too big – The apex of the roof truss will rise higher exposing the structure to various external severe atmospheric factors at its weakest point.
- Angle which is too small – The weight of the truss will not be properly distributed with the apex subjected to extreme tension which might cause its apex to collapse and the roof can fall inside the workshop.

(Any relevant answer) (2 × 2) (4)
[10]

QUESTION 6: TEMPLATE AND PATTERNMAKING

6.1 A template is a replica or the physical visuals of an actual object to be made, e.g. part of a machine made from cheaper material. (3)

6.2
- It is used to show the exact measurements of an actual object without measuring.
- It shows the shape of an object to be made without redrawing the pattern.

(Any relevant answer) (2 × 1) (2)

6.3 Sheet metal is used. Template-making requires machining, laying out and marking off using different tools and machines at temperatureswhich other materials cannot withstand. (3)

6.4 Templates made of cheaper material, can be easily damaged by external or natural factors, e.g. plywood will warp when it comes in contact with water or rain. (Any relevant answer) (2)
[10]

QUESTION 7: METALS

7.1

FERROUS METALS	NONFERROUS METALS
These metalsmainly contain irone.g. mildsteel,nickel, etc.	These metals contain very little or no iron e.g. copper.

(2 × 2) (4)

7.2 7.2.1 Malleability is the ability of a metal to be extended by means of hammering, rolling, bending and twisting without breaking.

7.2.2 Plasticity is the ability of the metal to be extended under load and retain its deformed shape after the load is removed.

(2 × 2) (4)

7.3
- To harden the outer layer for a good wearing surface
- so that the soft inner core resists shocksand loads from the workpiece (2)

[10]

QUESTION 8: GAS WELDING

8.1
- Oxygen
- Acetylene

(2)

8.2 8.2.1 The oxygen hose transports oxygen from the cylinder to the torch.

8.2.2 The stop valve is used to allow and stop the flow of gases from the cylinder.

(2 × 1) (2)

8.3 Acetylene, because it can burn by itself (2)

8.4 1:1 - equal amount of gases. (2)

8.5 A flame-cleaning nozzle is the reddish flame used to burn or remove paint, oxide and grease. (2)

[10]

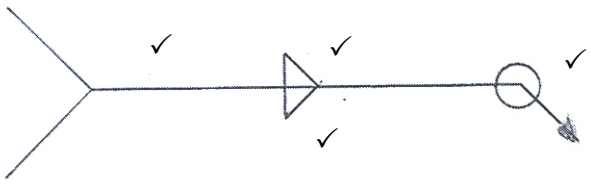
QUESTION 9: ARC WELDING

9.1 9.1.1 Reinforcement is the distance of the weld from the surface of the parent metal to the outer surface of the weld.

9.1.2 Run is the deposited molten metal during one passage of an electrode.

(2 × 2) (4)

9.2



(4)

9.3 Flux is used to shield external substances from contaminating the weld. (2)

[10]

QUESTION 10: CALCULATIONS AND PLANNING

SOLUTION:

Length of longer straight piece

$L_1 = 1000 - (2 \times 150)$

$= 700mm$

Length of shorter straight piece

$L_2 = 800 - (2 \times 150)$

$= 500mm$

Length of corners of circumference

$L_{corners} = \pi \times D_{MEAN}$

$= \pi \times (2 \times 150 + 3{,}5)$

$= 953{,}47\ mm$

THEREFORE TOTAL LENGTH $= 2(700 + 500) + 953{,}47$

$= 3353{,}47$ mm

[10]

TOTAL: 100