higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

RIGGING THEORY N2

4 APRIL 2018

This marking guideline consists of 6 pages.

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QUESTION 1

1.1. A: Soft eye hand spliced
B: Thimble eye machine swaged
C: Closed swag socket (3)

1.2 1.2.1 A long splice is used to join two ropes✓ which are required to pass through a block.✓ (2)

1.2.2 A short splice is simpler✓ but as this splice increases the size of the rope✓ it cannot be used in the same way as a long splice.✓ (3)

1.3
- Endless haulage
- Main and tail haulage
- Direct haulage (3)

1.4
- Increased wearing surface
- Greater strength
- Greater endurance
- Less wear (Any relevant 4 × 1) (4)

1.5
- Easier to handle
- Lighter in weight
- Greater resistance to shock loading
- Longer life
- Greater resistance to bacterial attacks (5)

[20]

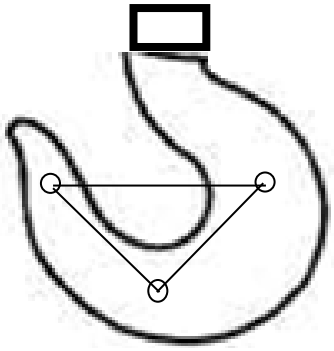
QUESTION 2

2.1 A: Block with a shackle
B: Block with a swivel hook
C: Line ball (3)

2.2
- Chain slings require careful storage and regular maintenance.
- Store chains on an A-frame in a clean, dry place.
- Oil chains before prolonged storage to avoid corrosion. (3)

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2.3



(3)

2.4
- Check that the gears and the ratchet are in good condition, i.e. no wear, breakage, dents.
- Check that the guards are not damaged.
- Check that the pulleys in the winch are not worn or damaged.
- Check the rope for any damage or wear.
- Check that the handle is in a good condition, not bent or cracked.

(Any relevant 5 × 1) (5)

2.5 Safety leather gloves (1)

[15]

QUESTION 3

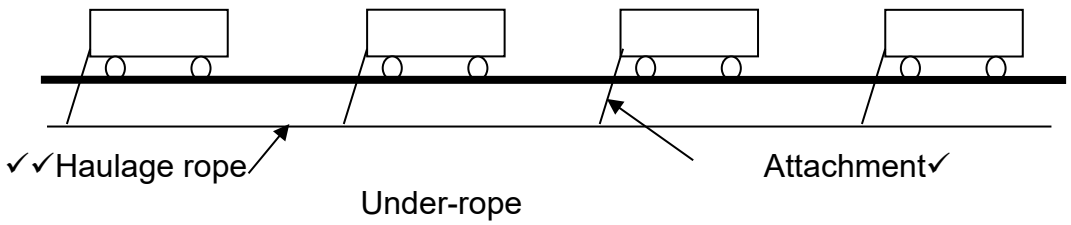
3.1
- Check for bent links.
- Check for cracks in weld areas.
- Check for scars or markings which tend to weaken links.
- Check for corrosion pits.
- Check the lifted fins on either electric or forged welded chains to indicate overload.

(Any 4 × 1) (4)

3.2
- Run-overs of vehicles
- Blasting
- Being trapped at crossings
- Running around on shafts of support pulleys or return wheels
- Falling/Hanging in the air
- Running through badly grooved rollers, guides, sleepers, etc.

(Any relevant 3 × 1) (3)

3.3



(3)

[10]

QUESTION 4

4.1
- Drum winder
- Koepe winder
- Elevators
- Cranes (4)

4.2 4.2.1 Breaking force is the measured force✓ necessary to break the wire in the rope that is under extreme tension.✓ The heat assists in reducing this force.✓

4.2.2 Reserve strength is the combined strength✓ of all the wires in the rope. The outer wires exclude the strength,✓ which serves as a wearing protection for the inner wires.✓

(2 × 3) (6)

4.3



(2)

4.4 4.4.1 Fibre rope (1)

4.4.2 The rope carries lubricant✓ and it has larger wires to resist heavy abrasion.✓ (2)

[15]

QUESTION 5

5.1 A: Crane hook or hook
B: Plate grab eye
C: Locking lever
D: Plate grab grip
E: Flat sheet material (5)

5.2. Plate grab (1)

5.3
- Check that the hook is not damaged.
- Check that the locking lever is in good working condition.
- Check that there is no cracks on the hook and plate grab eye.
- Check that the plate grab grip is not smooth.
- Check for wear, corrosion and rust. (Any relevant 4 × 1) (4)

[10]

QUESTION 6

6.1 6.1.1 Derricking is the movement of the jib crane when it is pivoting on a vertical plane.

6.1.2 Stability reach is the distance of the jib head pin from the point of intersection of the nearest base line and the vertical plane passing through the centre line of the jib.

6.1.3 Margin of stability is the percentage additional load required to bring the crane to the condition of tipping when it is handling the safe working load at any radius.

(3 × 2) (6)

6.2 6.2.1 An A-frame derrick is a frame which resembles an A-shape. The boom is hinged upon a horizontal beam near the bottom of the frame.✓Guy wires run from the top of the boom to the top of the frame and also from the top of the frame to anchor points on the ground.✓

6.2.2 A stiff-leg derrick is very similar to a guy derrick, except that it uses stiff legs instead of supportive guy wires to support the mast.✓✓

(2 × 2) (4)

6.3.
- Wide variety of settings, such as loading docks and dock yards, factories, construction sites, warehouses and workshops
- Take up little space and help factories make the most use of available floor space
- Can be used as primary lifting device
- Ensure maximum equipment and worker utilisation
- Available in wall-mounted and free-standing configurations and can be installed to accommodate about any building's design (5)

6.4 The chain is heated to a cherry-red colour temperature and then left to cool down slowly. (2)

6.5
- The chain will weaken due to heavy loads.
- The material will crystallise.
- Annealing increases life in the chain.
- The material grain is restored in the chain.

(Any relevant 3 × 1) (3)

[20]

QUESTION 7

7.1 $a)\ F = m.g$
$= 500\ \text{kg} \times 9{,}81\text{m/s}$✓
$= 4\ 905\ \text{N}$✓

$b)\ W = F \times distance$
$= 4\ 905\ \text{N} \times 50\ \text{m}$✓
$= 245\ 250\ \text{Nm}$✓
$= 0{,}245\ \text{MJ}$✓ (5)

7.2 $Sin\ \theta = \frac{Opposite}{Hypoteneuse}$

$Sin\ 30° = \frac{4}{A}$✓

$A = 4{,}05\ \text{m}$✓

$A = \sqrt{4^2} + C^2$✓

$C = \sqrt{4{,}05^2} - 4^2$✓

$= 0{,}634\ \text{m}$✓ (5)
[10]

TOTAL: 100

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