

 Eskom	Standard	Group Capital Division
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Title: **Safe Use of Lifting Machines and Lifting Tackle**

Unique Identifier: **39-98**

Alternative Reference Number: **N/A**

Area of Applicability: **Group Capital Division**

Document Type: **ST**

Revision: **1**

Total pages: **59**

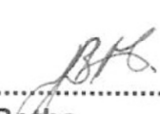
Revision date: **August 2016**

Document Classification: **CONTROLLED DISCLOSURE**

COMPILED BY

FUNCTIONAL RESP.

AUTHORISED BY


A Botha
Senior Advisor OHS


J Naidoo
Senior Manager OHS


H J Steyn
Chairperson of the GCD SHE
Steering Committee
SGM Construction
Management

Date: 23/08/2013

Date: 27/8/13

Date: 30 Aug 2013

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1 Introduction

Safe lifting is dependent on managing the lifting equipment from procurement to disposal. The safety of lives and the integrity of loads are dependent upon the skill of the Statutory Inspector (Lifting Machines and Equipment), the Supervisor, Competent Rigger / Slings Artisan and the Operator.

The relevant skills, training, knowledge and instructions have to be correctly applied to ensure lifting machines and tackle are operated safely and without incidents.

No written instruction can supplement good training and management and where there is concern this should be referred to the responsible persons detailed below so that risk and compromise can be eliminated.

2 Roles and Responsibilities

2.1 Employer

The Employer shall ensure:

- 2.1.1 That the relevant information in this procedure is communicated to all Eskom supervisors, employees, contractors and Temporary Employment Service Providers and any other relevant persons.
- 2.1.2 That this procedure is implemented.
- 2.1.3 That all employees are trained and are made aware of this procedure before they may be allowed to operate any lifting machinery or conduct any rigging tasks.
- 2.1.4 That all lifting machines on his/her site whether it is Eskom property or contractor's property is safe to use and that the operator is trained according to prescribed requirements and training should be conducted by a TETA accredited training provider.
- 2.1.5 That all new purchased lifting machines and tackle are according to legal requirements.
- 2.1.6 That all lifting machine incidents are reported and investigated by a competent and appointed incident/accident investigator.
- 2.1.7 That all lifting machines shall be inspected and tested by a Lifting Machine Inspector (LMI) accredited by The Engineering Council of South Africa (ECSA) and affiliated with a Lifting Machine Entity (LME) registered by the Department of Labour.
- 2.1.8 A Crane Co-ordinator is appointed in writing where there are Tower Cranes.

2.2 GMR 2(1)/CR 6.1

The appointed GMR 2(1)/CR 6.1 shall ensure:

- 2.2.1 That he/she has signed the operators lifting machine authorisation permit.
- 2.2.2 That all lifting machines and tackle are maintained according to the OHS Act Driven Machinery Regulation 18.
- 2.2.3 That he/she appoints a Competent Crane Co-ordinator as per SANS 12480.

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2.2.4 That all lifting machines are inspected before entering the site by the Crane Co-ordinator.

2.2.5 That the Contractor provides a crane safety management plan.

2.3 The Crane Co-ordinator

The Crane Co-ordinator shall:

2.3.1 Co-ordinate the sequence of operations of tower and other cranes on sites that have more than one crane, to prevent the collision of the cranes, components and loads

2.3.2 Ensure that the lifting programme is in such a way that no driver is allowed to operate the crane for an unreasonably long period, taking into account environmental conditions.

2.3.3 Ensure that the operator take breaks from the working activity in line with those of other personnel on the site.

2.3.4 Ensure all lifting machines on site are recorded on a lifting machine register.

2.3.5 Inspect all lifting machines before entering an Eskom site

2.3.6 Ensure that all documentation is valid (annual load tests, rope test hook block inspections, 6 monthly inspections, operator certification, applicable drivers licence , daily crane inspections and 3 monthly lifting tackle inspection).

2.3.7 Ensure that he is in possession of the latest site crane position lay out.

2.3.8 Arrange at least two Crane Coordinator's meetings per month on site.

2.3.9 Ensure that all contractors appoint Competent Crane Coordinators.

2.3.10 Attend lifting machine and tackle incident and accident investigations.

2.3.11 Conduct monthly legal compliance audits on lifting machines and tackle.

2.3.12 Attend weekly contractor work integration meetings.

2.3.13 Verify rigging studies.

2.3.14 Perform daily site inspections.

2.3.15 Sign off tower crane erection applications.

2.3.16 Ensure that all operators operate cranes as per operating codes.

2.3.17 Be involved with the crane route planning.

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2.3.18 Only sites where there are tower and mobile cranes the site must appoint a crane co-ordinator.

2.3.19 Develop a plan on how to manage lifting machines and tackle on site.

2.4 The Lifting Machine Supervisor

The Lifting Machine Supervisor shall ensure:

2.4.1 That operators are aware of the dangers involved when handling all types of loads.

2.4.2 That risk assessments are conducted prior to commencement of work and records must be kept.

2.4.3 That all lifting machine operators are trained and certified for the type of crane being operated.

2.4.4 That all equipment is examined, load tested, inspected and records kept on site and copies in the crane.

2.4.5 That a working at heights plan is developed for conducting inspections on top of mobile and tower cranes.

2.4.6 Act as the person responsible for maintenance and safety of equipment.

2.4.7 That all lifting equipment unsafe for use be withdrawn from service and be clearly marked "UNSAFE-NOT TO BE USED". If it cannot be repaired it should be removed from service, destroyed and recorded as such on the log sheet.

2.4.8 All lifting machines and tackle are examined according to the statutory requirements and the status is recorded in a log sheet.

2.4.9 Sign all log sheets after inspections.

2.4.10 That all lifting equipment is properly marked with a unique identification number and recorded.

2.4.11 That all lifting machine operators are trained and in possession of a valid carry card/permit for the equipment to be operated.

2.4.12 That all lifting equipment incidents including near misses are reported and investigated.

2.4.13 Ensure that a register of all lifting machines and tackles is available.

2.4.14 Ensure that there is a meeting with all parties involved prior to any critical lift being performed.

2.5 Lifting Machine Inspectors (LMI)

The Lifting Machine Inspectors shall ensure:

2.5.1 That all lifting machinery and tackle are thoroughly examined for defects, deficiencies or wear that will affect, or could affect the safe operation of the machinery or tackle.

2.5.2 That load tests are carried out according to the Occupational Health and Safety Act Driven Machinery Regulations 18 and SANS 19.

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- 2.5.3** That all findings are entered on the log sheet and signed.
- 2.5.4** That if the equipment is not available for inspection, it must be recorded accordingly and the supervisor is advised.
- 2.5.5** That he/she is appointed in writing by the relevant employer or user.
- 2.5.6** That he/she is registered with ECSA and that he/she is employed by a company registered as a Lifting Machines Entity (LME) with the DoL.
- 2.5.7** That a risk assessment is conducted prior to load testing and inspections.
- 2.5.8** That a load test certificate signed by him with his registration number and the registration number of the LME is issued.
- 2.5.9** That inspections are conducted according to SANS 019
- 2.5.10** That he/she only conducts load tests and inspections on lifting machines and tackle that he/she is registered for.

2.6 Operator

The Operator shall ensure:

- 2.6.1** That he/she is competent to operate the particular equipment.
- 2.6.2** That he/she is in possession of a lifting machine authorised certificate/carry card.
- 2.6.3** That the equipment is safe to use and if not, report to supervisor.
- 2.6.4** That he/she conducts a risk assessment prior to commencing work.
- 2.6.5** That he/she reports all incidents and near misses to the supervisor before the end of the shift.
- 2.6.6** That he/she wears his/her PPE.
- 2.6.7** That he/she has a valid medical and psychological certificate of fitness.
- 2.6.8** That he/she is aware of their duties and responsibilities.
- 2.6.9** That hand signals are posted and observed. (See SABS 0296:1998 or other accepted standard)
- 2.6.10** That there are no loose objects on top of loads during lifting.
- 2.6.11** That he/she does not lift, move or support any person by means of a lifting machine unless such machine has been fitted with a personnel carrier approved by an inspector of the Department of Labour.
- 2.6.12** That the crane used to lift people is inspected every 6 months and load tested (not exceed 50% of crane lifting capacity).
- 2.6.13** That he/she takes windy, adverse weather and ground stability conditions into consideration (where required perform a geotechnical study)
- 2.6.14** That the load is secure and balanced

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- 2.6.15** That Load Mass is identified, if uncertain, that it be verified or estimated by a competent person.
- 2.6.16** All controls in the cranes are clearly marked in English
- 2.6.17** That signage is displayed and that the area is barricaded where hazards to bystanders exist, work areas shall be designated.
- 2.6.18** That safe access shall be provided for equipment operated from elevated positions.
- 2.6.19** That he/she has visual contact with the Signal man at all times; the signal man must be able to see the operator clearly, to communicate with hand signals (two way radio communication where required).
- 2.6.20** That he/she has a valid and appropriate national driver's license.
- 2.6.21** That all tower crane operators and mobile crane operators must attend a working at heights training course
- 2.6.22** That he/she is trained to lift a man cage and found competent.
- 2.6.23** That they are appointed in writing.
- 2.6.24** that they are certified and trained for the attachments as specified in DMR 18
- 2.6.25** That he/she does not override a crane safety system.
- 2.6.26** All crane operators must be trained/assessed to conduct tandem lifts

2.7 Rigger, Slinger and Artisan

The Rigger, Slinger and Artisan shall ensure:

- 2.7.1** That he/she understands the hazards involved when lifting loads.
- 2.7.2** That he/she conducts a risk assessment prior to do any rigging.
- 2.7.3** That he/she is qualified in radio procedures. (When Radios are utilised)
- 2.7.4** That he/she has passed a basic rigging/slinging load course and should only do straight lifts up to 5 tons.
- 2.7.5** That he/she uses taglines or guide ropes for swaying loads.
- 2.7.6** That he/she knows all hand signals.
- 2.7.7** That he/she is so positioned and is clearly visible to the operator at all times when a load is being moved.
- 2.7.8** That he/she wears appropriate PPE. (Gloves, Hard Hat, Safety Shoes, Overalls and high visibility vests)
- 2.7.9** That the load is secure and balanced.
- 2.7.10** That a rigging study of all critical lifts are done and approved prior to a lift taking place.

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2.8 Training

- 2.8.1 All senior and supervisory personnel shall be instructed on the content of this procedure in order to ensure implementation of the procedure in their areas of responsibility.
- 2.8.2 No supervisor shall supervise or control lifting operations, without having undergone training on the operational aspects of this procedure.
- 2.8.3 The supervisor in any specific workplace shall ensure that no lifting operations take place, which do not comply with legal as well as Eskom procedure.
- 2.8.4 All operators shall be trained by an organisation accredited by the TETA.
- 2.8.5 All trainers/assessors shall be registered with the TETA and must be competent in operating the specific equipment for which training is provided or assessed.
- 2.8.6 Lifting machine operators shall be assessed according to the relevant Unit Standards for the specific lifting machine. .
- 2.8.7 The slinger and artisan shall be declared competent in the Sling Loads module (Basic Rigging as per unit standards)
- 2.8.8 The rigger must have passed a rigging trade test (red seal) before carrying out any specialised rigging.
- 2.8.9 All tower crane operators, mobile crane operators and inspectors climbing on top of mobile cranes must conduct a working at heights training course by an accredited provider.
- 2.8.10 All crane operators must be trained to use a fire extinguisher.
- 2.8.11 All crane operators must be trained/assessed to conduct tandem lifts.

2.9 Purchasing

- 2.9.1 No equipment shall be used by Eskom or the contractor unless it has passed a SABS performance test and a test certificate must be provided with delivery of equipment.
- 2.9.2 All purchasing requirements must be adhered to for quality acceptance.
- 2.9.3 All necessary specifications should be provided.
- 2.9.4 All lifting tackle and Machines must be bought through a reputable provider.

2.10 General Lifting Operation Safety Requirements

2.10.1 Planning of the Lifting Operation

General

- a) All lifting operations shall be planned to ensure that they are carried out safely and that all foreseeable risks have been taken into account.
- b) In cases of repetitive or routine basic lifting operations, this planning might only be necessary in the first instance, with periodic reviews to ensure that no factors have changed.
- c) Planning of the lifting operation should take into account:
 - The load, its characteristics and the method of lifting paying particular attention when loads are lifted out of water, e.g. flow, suction and loss of buoyancy;

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NOTE: It may also be necessary to make allowance for any adhesion between the load and its support.

- The selection of a suitable crane(s) appropriate to the operation ensuring that adequate clearances are maintained between the load(s) and the crane structure.
- The weight of all lifting attachments to be taken into account when assessing the load on the crane(s).
- The position of the crane(s) and of the load before, during and after the operation.
- The site of the operation including proximity hazards (excavations, power lines etc.).
- Adverse weather conditions to be taken in account.
- Ground stability to be taken into account (geotechnical study)

2.11 Critical Lifts

There are five categories for which a lift can be defined as a Critical Lift; (1) *any lift weighing in excess of 20 tons*, (2) *any lift involving a crane suspended work platform (man cage)*, (3) *any lift over critical operating and/or process equipment* and (4) *any lift that exceeds 85 % of the crane's load chart* (5) *any lift that utilises more than one lifting device (Tandem Lift)*. (6) *Load transfers*. (7) *night lifting*.

2.11.1 Critical Lifts are defined as:

Any lift that utilizes more than one crane or hoisting device which include two different cranes (tandem lift), a crane and a tele-handler (forklift), both the auxiliary and main boom of a single crane. Using a come-a-long (turf) to balance a load for lifting would not typically make the lift critical.

Any lift weighing in excess of 20 tons – this would include the weight of a stored jib (if applicable) the block & hook, all rigging components, total weight of the load being lifted and the load line weight.

85% of Load Chart – lifts that include the total weight to be in excess of 85% of the load chart taking into consideration the current configuration of the crane. Note that an operator may lift a load at 75%, slew then boom down and be in excess of the 85% rule;

Any Lift involving a crane suspended work platform (Man Cage) – Using a crane to lift a worker or workers to an elevated position by means of a personnel basket or man cage. The need to suspend personnel by using a basket or man cage lifted by a crane must be the last resort. A more feasible means of performing the work safely shall be considered first before lifting personnel to elevated areas with a crane.

Any lift in close proximity of electrical equipment – this would include energised systems, tanks and operating processes.

Multiple Lifting Devices (Tandem Lifts) – any lift in excess of 20 tons. Total weight includes load, hoist line weight below the tip of the boom, Weight of the Jib installed or stored, load block weight and all rigging equipment (shackles, slings, lifting beams, etc);

Night time lifting operations.

2.11.2 Rigging Studies

- A detailed rigging study shall be prepared prior to any critical lift.
- The rigging study shall include detailed drawings of the crane/s, lifting equipment, and load, area of operations and calculations of total weight.
- The rigging study shall be approved by an engineer.
- The steps of lifting shall be indicated on the lifting plan or drawings

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2.12 Risk Assessment

As part of the planning process a task specific risk assessment must be carried out to identify the hazards and risks associated with the proposed lifting operation. The assessment should evaluate the risks involved, the nature and extent of any measures required to mitigate those risks. The supervisor should also take into consideration hazards identified by the overall site risk assessments.

Generic risk assessments are unlikely to be sufficient since most sites have hazards that are unique to their situation which should be taken into account in the separate site specific assessment.

The results of the risk assessment should be recorded in writing and used in the preparation of the safe work procedure for that site.

The risk assessment together with the manufacturer's instructions, should then be used to develop a detailed safe work procedure for the safe transportation, assembly, erection, use and dismantling of the equipment at that site.

A daily task specific risk assessment shall be conducted prior to any lift.

2.13 Safe Work Procedure

- a) Once the risk assessment has been carried out, the supervisor should ensure that a full Safe Work Procedure is prepared, detailing the safe system of work for the lifting operation.

2.14 Personal Protective Equipment

The Supervisor shall ensure that:

- Personal Protective equipment appropriate for the site and activity is issued (hard hats, eye protection, full body harness, safety boots, reflective vests and hearing protection) where applicable.
- Equipment is inspected and maintained in good working order and kept on register.
- That they are trained in the correct, safe use, maintenance and limitations of PPE.
- Certain safety equipment, for example hard hats, eye protection and fall protection equipment can deteriorate with age.

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- Damaged safety equipment must be replaced immediately.
- Records are kept of all PPE issued.
- Damaged or unserviceable PPE must be removed and discarded, discarded PPE must be recorded and removed from the register.
- A discarding of lifting tackle system to be put in place

2.15 Use of Personal Protective Equipment

2.15.1 All personnel working on, visiting or in the vicinity of the crane should be made aware of the requirements relating to their personal safety and to use the personal protective equipment provided.

2.15.2 It is essential that personnel are instructed /trained in the correct use, maintenance and limitations of the personal protective equipment provided.

2.16 Wind Loading

2.16.1 Cranes are designed to withstand the forces produced by winds of a specified velocity, both in-service and out-of-service. It is important that the wind areas of the crane, and hence the forces acting on it, are not increased by the addition of signs, banners or panels without the written approval of the crane manufacturer.

2.16.2 The crane should not be operated in wind speeds that are in excess of those specified in the manufacturer's specifications for the crane or site requirement or activity (2.17).

2.16.3 Gusting wind conditions can have an additional adverse effect on the safe handling of the load and the safety of a crane. Even in relatively light wind conditions, extra care should be taken when handling loads presenting large wind catching areas which can act as sails and affect their ability to be handled safely or the stability of the crane.

2.16.4 The limitations on wind speed for erecting, testing and dismantling the crane could be lower than the limitations for normal operation and in cases of doubt advice should be obtained from the manufacturer or a competent engineer.

2.16.5 Test sites should not be located in areas which are known to be exposed to extreme weather conditions.

2.16.6 Personal carriers should not be used in winds in excess of 7m/s(25km/h)

2.16.7 Movement of the personal carriers shall be done in a slow, controlled cautious manner, with no sudden movements of the crane. The lifting or lowering speed shall not exceed 30 m/min (0, 5 m/s).

2.17 Wind-Speed Indicating and Monitoring Devices (Tower cranes and people carriers)

2.17.1 Where fitted, anemometers or other wind-speed measuring devices should have their indicators located in clear view of the crane operator. The device must be inspected daily

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by the operator and calibrated annually and they should be maintained in good working order.

2.17.2 The sensor of the indicator should be positioned so that it can measure air flow uninterrupted by the crane or adjacent structures. Sensors must advisably be positioned on the highest point of the crane.

2.17.3 No lifting will take place if there is a wind speed equivalent to or exceed a strong breeze.

2.17.4 Tower cranes operating in close proximity of other cranes will have anti-collision devices installed.

NOTE: Wind Speed meters must be calibrated

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Table- Beaufort scale wind conditions

1.	2.	3.	4.	5
Beaufort number	Description of wind	Specifications for use on land	Wind Speed km/h	Wind speed m/s
0	Calm	Calm; smoke rises vertically	$>0 \leq 1$	$>0 \leq 0,3$
1	Light air	Direction of wind shown by smoke	$>1 \leq 5$	$>0,3 \leq 1,4$
2	Light breeze	Wind felt on face; leaves rustle; ordinary vanes moved by wind	$>5 \leq 12$	$>1,4 \leq 3,3$
3	Gentle breeze	Leaves and small twigs in constant motion; wind extend light flag	$>12 \leq 19$	$>3,3 \leq 5,3$
4	Moderate breeze	Raises dust and loose paper; small branches are moved	$>19 \leq 28$	$>5,3 \leq 7,8$
5	Fresh breeze	Small trees in leaf begin to sway; crested wavelets from on inland waterways	$>28 \leq 38$	$>7,8 \leq 10,6$
6	Strong breeze	Large branches in motion; whistling heard in telephone wires; umbrellas used with difficulty	$>38 \leq 50$	$>10,6 \leq 13,9$
7	Near gale	Whole trees in motion; inconvenience felt when walking against wind.	$>50 \leq 62$	$>13,9 \leq 17,2$
8	Gale	Breaks twigs off trees; generally impedes progress	$>62 \leq 75$	$>17,2 \leq 20,8$
9	Strong gale	Slight structural damage occurs(chimney pots and slates removed)	$>75 \leq 87$	$>20,8 \leq 24,2$

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2.18 Identification of Person Directing Crane Movements

- 2.18.1** The person directing crane movements (slinger or signaller) should be easily identifiable to the crane operator, for example by wearing high visibility clothing or by using radio call signs.
- 2.18.2** When choosing high visibility clothing, backgrounds, type of illumination and other relevant factors should be taken into account.
- 2.18.3** Only one person shall give hand signals.
- 2.18.4** All tower cranes shall have two way radio communications between the operator and the banks man.
- 2.18.5** Two way radios where applicable should be licenced.
- 2.18.6** Only trained persons shall give hand signals

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Hand Signals SANS 10296:2008

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2.19 Access and Emergency Escape

- All contractors shall develop, implement and maintain an emergency rescue procedure for all crane activities.
- Emergency drills shall be conducted at least every 3 months and records kept there off.

2.20 Machine Guarding

All machine guarding should be properly fitted.

Only competent personal shall remove or fit guards and covers for maintenance purposes

2.21 Proximity Hazards

2.21.1 General

- a) Consideration should be given to the presence of proximity hazards such as overhead electric lines or cables, nearby structures, other cranes or vehicles being loaded or unloaded, stacked goods and public access areas including highways, railways and rivers.
- b) Where any part of the crane or its load cannot be kept clear of such hazards the appropriate authority should be consulted.
- c) The danger to or from underground services, or electric cables, should not be overlooked. Precautions should be taken to ensure that the crane foundation is clear of any underground services or, where this is not possible, that the services are adequately protected against damage.
- d) At any place where a crane or its load passes an obstacle, the following apply.
 - Where practicable, the crane path should be clearly defined by marking to ensure that it is kept free from obstruction, and a clearance of not less than 600 mm should be arranged between any part of the crane and any obstacle. Where it is not reasonably practicable to achieve this clearance, effective precautions should be taken to prevent access to any trapping hazards.
 - Where goods are regularly stacked near a crane, boundary lines for the stacking of goods should be permanently marked on the ground.

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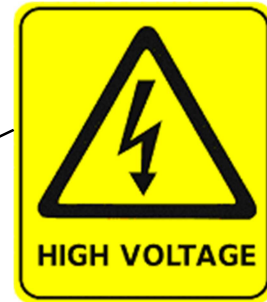
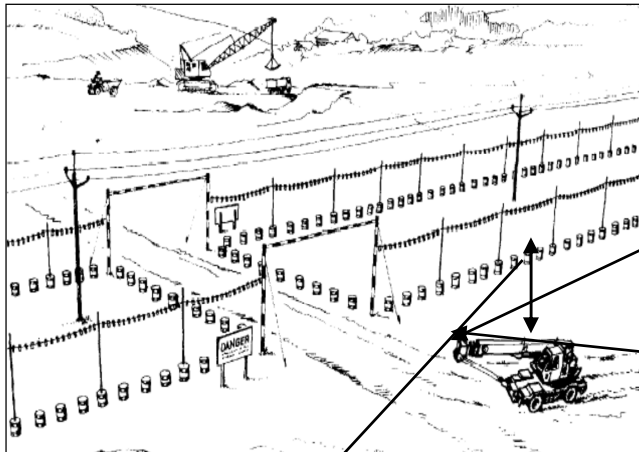
2.21.2 Overhead Electric Lines and Cables

- a) Many fatal accidents have occurred due to some part of a crane, including rope, slings or load, touching, or even coming near to, overhead electric lines or cables.
- b) Where the cables form a proximity hazard and it is reasonably practical to turn the power off, steps should be taken by the supervisor to isolate the power.
- c) All distances should be measured at ground level from a position estimated visually to be vertically below the outermost conductor at a tower or pole position and should include an allowance for the load
- d) Contact the Eskom supplier to isolate the power line before working in close proximity of power lines
- e) **Warning.** All overhead lines and other electrical apparatus should be treated as live unless declared “dead” and “safe” by the line operator. If in doubt, seek advice.
- f) A notice bearing the following wording should be placed in the cab of all cranes likely to work in the vicinity of overhead electric lines or cables (BEWARE OF POWER LINES).
 - i. Isolate the line before working in close proximity of the line.
 - ii. “If machine makes contact with live electric line or cable, the following precautions must be observed:
 - Remain inside cab.
 - Warn all other personnel to keep away from crane and not to touch any part of the crane, rope or load (fibre rope to be used as tag line).
 - If the machine cannot be moved away, the operator must remain inside the cab. If possible, someone must be alerted to inform the electricity supply authority at once. No further work must be done until it has been confirmed that conditions are safe.
 - If it is essential to leave the cab because of fire or some other reason, the operator must jump clear as far away from the crane as possible. The crane and the ground must not be touched at the same time.
 - The responsible person of the works or authority concerned must be informed of the situation immediately and until assistance is received, someone should remain near the crane to warn others of the danger.”

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- Devices are available that are designed to be fitted on cranes to give warning when the crane comes within a predetermined distance of overhead electric lines and cables. Such devices should not be considered as a substitute for a safe system of work.
 - Implement necessary permit controls (e.g. ORHVS).
 - Where overhead lines are present on a site indicate all positions where roadways will cross under, or approach, the lines.
- iii. Identify the “owner” of the line and formalize agreements regarding safety risk management before work commences (note: the owner will not always be Eskom).
- iv. Where frequent passage is required, consider the re-routing of the lines.
- v. If feasible, isolate the lines. However, at all times assume that the lines are live.
- vi. Ensure that all truck mounted cranes and stringing machines working in close proximity of live conductors are fitted with equipotential foot plates
- g) Keep movement of vehicles, equipment and plant beneath lines to a minimum.
- h) Established clear site rules to address the movement of vehicles and equipment beneath these lines.
- i) Clearly demarcate the routes beneath the lines and erect warning signs.
- j) Ensure level and firm roadway surfaces to avoid bouncing of equipment.
- k) Height restriction barriers/cross-bars must be erected on both sides of the lines. Establish the permitted safe clearances in consultation with the owner of the line.
- l) Illuminate all signage and barriers if work is to be done after dark.
- m) If plant is to be operated under lines, suitable physical restraints must be fitted to limit their motion to prevent encroachment.
- n) A Supervisor, or a “Banksman”, must be provided to guide the plant beneath the line.
- No task may be performed without a relevant risk assessments having been approved.

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Reference: U.K. HSE doc Guidance Note GS 6 1997

Height as specified by Operating Procedure for High Voltage
The poles must be 6 meter from the overhead line.

2.21.3 Leaving the Crane Unattended

- a) It is essential that a crane operator is present when a load is suspended from a crane.
- b) When a crane is left unattended for even a short period, it is essential that:
 - All loads have been removed from the lifting attachment/accessory and the lifting attachment/accessory has been left in a safe position.
 - The power supplies to all motions have been switched off or the engine has been stopped.
 - Appropriate motion brakes and locks have been applied to put the machine in a safe condition.
 - The operator should remove the ignition key and any other keys from the crane whenever they leave the machine unattended.
 - For longer periods and for out-of-service conditions, switches should be locked off, fuel supplies cut off and any doors giving access to machinery or control cabs locked to prevent unauthorized access.
 - Machinery should be left in the out-of-service condition in accordance with the operating instructions.
 - Chock blocks to be used to prevent the crane from moving.
 - Tower cranes must be left in free slewing condition when not in operation.
 - All tower cranes shall be earthed for lightning protection.
 - COC top and bottom DB boards

2.21.4 Condition of Lifting Machines

- a) Must be conspicuously and clearly marked with the maximum mass load or a table showing the maximum mass load with respect to every viable condition shall be posted by the user.
- b) Must have at all times at least three full turns of rope on the drum of each winch when the machine is run to its lowest limit.

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- c) All power driven lifting machinery shall be fitted with a braking device which can hold the maximum mass load when the power supply fails.
- d) A limiting device should automatically arrest the driving effort when the load to be lifted is greater than the rated mass load.
- e) Factors of Safety: (FOS) for chains and ropes “forming an integral part of the lifting machines” will be at 4 for chains and at 5 for steel wire ropes (S.W.R).
- f) Every hook or other attaching device which form an integral part of the machine to be so designed or proportioned so that accidental disconnection of the under working conditions cannot take place. This implies safety latches on lifting machine hooks.
- g) Annual Load Test and thoroughly examine all ropes, chains, hooks and safety devices (of whole installation) by Competent Person: “who has knowledge and experience of” lifting machines and tackle and is registered with ECSA at intervals not exceeding 12 months and 6 months.
- h) Apart from the Annual Load Test, the user shall “thoroughly examine” all ropes, chains, hooks and safety devices” at intervals not exceeding 6 months when lifting persons.
- i) Tower Cranes shall be inspected after severe storms and blasting
- j) Any lifting machine above 5 ton shall be fitted with a safe load indicator
- k) When lifting man cages it shall be load tested every 6 months
- l) A dummy lift shall be conducted before lifting personnel.

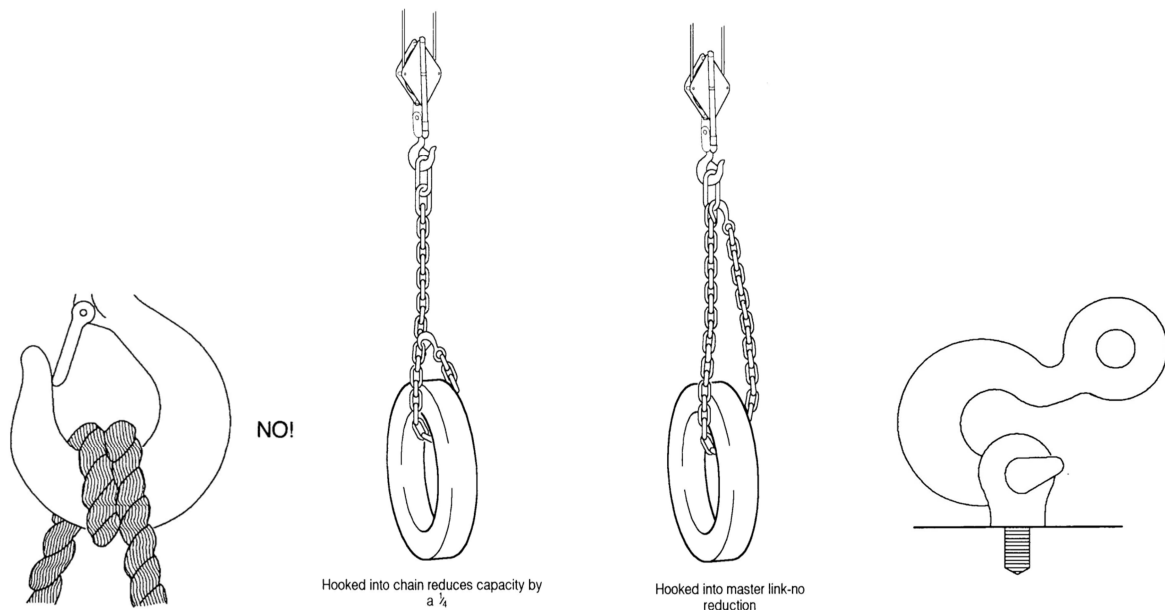
2.21.5 Do's and Don'ts of Rigging

- a) Never attempt to operate a hoist unless you are authorized and properly instructed.
- b) Position the hook directly over the center of gravity so that line of pull is vertical.
- c) Never use a load chain as sling or back hook.
- d) Do not paint load hooks.
- e) Never overload! Check mass to be lifted do a proper calculation.
- f) Do not twists load chain or put knots to shorten chains?
- g) On multi-reeved hoists ensure that the bottom hook block has not flipped.
- h) Check and prepare landing areas properly (conduct a proper risk assessment).
- i) Chain hoists are designed for only one person to operate hand chain.
- j) No cheater bars shall be used on lever hoists to improve leverage.
- k) Learn how to operate free wheel mechanism on lever hoists properly.
- l) Ensure that hoists are properly positioned on crawl or to attaching point.
- m) Never run the load chain over a sharp edge (proper protection).
- n) Never throw or drop a hoist. (Handle with care.)
- o) Never use a hoist for lifting, transporting or supporting people.
- p) Never lift or transport loads over fellow workers (barricade).
- q) Push, rather than pull loads suspended from trolleys.
- r) Check that the travel path is clear (banks man to be used).
- s) Avoid running hoists/overhead gantries against end stops.
- t) Proper storage.
- u) Inspect and clean lifting tackle and dry before storage.

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- v) Suspend chain and lever hoists from their top hook with load chain clear off the ground.
- w) Ensure that all lifting machines not in use, is locked to prevent unauthorized entrance or use.
- x) Never leave chain blocks/lever hoist suspended with loads

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Never wrap a sling around a hook

Hook into master link

Use a shackle

2.22 General Safety Procedures when Lifting

- 2.22.1** Prior to lifting, all lifting lugs or lifting points shall be checked to ensure that they are of adequate strength (engineering design and approval).
- 2.22.2** Avoid shock or impact loading by taking up the slack gradually and then lifting the load slowly and carefully.
- 2.22.3** Always place the crane hook directly above the centre of gravity of the load to avoid load tilting or side loading.
- 2.22.4** Prepare landing areas properly so as to ensure that slings are not crushed underneath loads and that slings can be pulled out from underneath a load by hand.
- 2.22.5** Avoid dragging slings on the ground as this causes excessive wear.
- 2.22.6** Avoid sharp cornered loads and use protective packing where practical, to minimize damage to chain links and lifting equipment.
- 2.22.7** Avoid sudden jerks when lifting.
- 2.22.8** Avoid acute angles between the legs of a chain sling and if large angles cannot be prevented, study the sling charts and use the appropriate size chain.
- 2.22.9** Do not use slings with damaged or distorted links or components.
- 2.22.10** Free legs of multiple chain slings should not be allowed to hang loose. Hooks must be hooked into the master link.
- 2.22.11** Use proper crane signals (Trained personnel according to SANS 10296:2008).
- 2.22.12** Never leave a crane unattended with a load hanging in the air.
- 2.22.13** When in doubt about any aspect of slinging or loading, ask a competent person or the Rigger's advice and refer to rigging study
- 2.22.14** Never wash or use Alloy chain slings in acid or chemical baths containing acids such as hydrochloric or sulphuric acid.
- 2.22.15** Be careful when chains are used on extremely hot loads. Consult Manufacturers Chain Catalogue.

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- 2.22.16** Use tag lines to prevent swaying or rotation of a load and to position loads for landing.
- 2.22.17** Do not wedge a hook into position to avoid hook bending when a load is applied to the side.
- 2.22.18** Balance all loads carefully. This is essential where basket type slings are used. Lift the load slightly off the ground, take up the slack and if the load does not sway or tilt, take it away slowly and carefully.
- 2.22.19** Never weld on a suspended load.
- 2.22.20** When using eye bolts do not apply side loading.
- 2.22.21** Ensure that the correct lifting tackle is used for the task.

2.23 Webbing Slings

- 2.23.1** Each sling shall be inspected visually both before and after use by the user. Any visible damage shall warrant removing the sling from service. Generally damaged outer sheaths can be repaired, whilst the inner fibers cannot be repaired.
- 2.23.2** If the outer sheath or joint stitching tears or is damaged during lifting, this may be indicative of internal fiber damage. If this occurs the load is to be lowered and the sling inspected by a competent person, depending on which it may then be sent to the manufacturer for possible repair.
- 2.23.3** Slings shall not to be used to lift components that are hot, ($> 50^{\circ}\text{C}$).
- 2.23.4** Components with sharp edges which are to be lifted in such a manner that the sling has to pass over such sharp edges must have suitable protection inserted between the sling and the sharp edge to avoid cutting of the sling. Special 'softeners' are available from the manufacturer for this purpose.
- 2.23.5** Turning of components to be lifted and performed by utilizing eyebolts and / or other lifting lugs or points, rather than allowing for sling to pass over sharp edges. Slings should not be used to turn turbine components such as castings and diaphragms, which could give rise to shearing of the sling. Where this is not practical use of steel slings is recommended.
- 2.23.6** Slings shall not to be used or allowed in the vicinity of any chemicals, welding, brazing, and metal cutting processes, grinding where heat, arcing, sparks or other possible source of damage may be induced to the slings.
- 2.23.7** The safe working load of the sling is not to be exceeded. Hence knowledge of the Safe Working Load (SWL), mass of component to be lifted and basic rigging principles is paramount.
- 2.23.8** Slings shall not be shortened or knotted in any way.
- 2.23.9** Slings shall not be dragged along the floor or over any surface or objects, which may abrade or damage the sling.
- 2.23.10** Slings shall be hitched in a manner providing control of the load.
- 2.23.11** Slings shall not be pulled from under a load when a load is resting on a sling.
- 2.23.12** Twisting and kinking of the sling legs in a lift shall be avoided.
- 2.23.13** Shock loading of slings should be avoided.
- 2.23.14** Should a sling become wet for any reason, it must not be forced dried by exposing to heat in any form. It must be allowed to dry naturally in a hanging position. Wet slings are not to be used.
- 2.23.15** Where slings have been purchased for specific critical lifts such as for the lifting of electrical rotors, these slings shall be deemed to be dedicated to such task, and shall not be used for any other purpose.

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Note: The use of webbing and endless round slings to be avoided as far as possible

2.24 Incident Reporting

2.24.1 Every failure, and serious incident with regards to lifting machines and tackle in use shall be reported immediately to the crane co-ordinator and the SHE Department, and an Incident Report shall be raised within 24 hours.

2.24.2 All lifting equipment, which was involved in the failure or resulted in the failure or incident shall be collected and kept for inspection and possible examination if required. Normal incident investigation procedures shall be followed and a competent line manager must give direction as to the actions to be followed and compile an Incident Investigation Report.

All Section 24 incidents and General Machinery Regulation 7 incidents shall be reported to the Chief Inspector on the day of the incident.

2.25 Incident Investigation

All lifting machine or lifting tackle incidents including near miss incidents must be investigated within 7 days of the incident by the employer /competent and appointed incident investigator.

2.26 Safe Access to Lifting Machines

2.26.1 For all lifting machines operated from elevated positions, there should be safe access (tower and gantry cranes).

2.26.2 Access gates to steps and stairways of lifting machines should be locked by the operator when the machine is not in use. When lifting machines are not in use the keys must be locked away.

2.26.3 There must be a proper lock out system in place.

2.27 Barricading of Work Area

2.27.1 The responsible person must ensure that the area where a crane is used is properly barricaded to prevent injuries to pedestrians and visitors on site.

2.27.2 Personnel directly involved with the lifting operation can stay inside the lifting area but not under the suspended load.

2.27.3 The barricading shall be conservatively set with consideration to load swinging and bouncing if the rigging were to fail.

2.27.4 The flagman must warn the people if they are passing over workers by means of a red flag and whistle to keep pedestrians out of barricaded area

2.28 Maintenance and Inspection

2.28.1 Lifting machines

- a) Fork trucks are load tested annually by an approved Lifting Machine Inspector (LMI)
- b) All lifting machines shall be inspected every six months.
- c) Frequency of inspections should be determined by the nature of the work done and not only as per statutory requirements.
- d) Lifting machines that are used to lift persons shall be examined by a LMI at least once every six months, or at a shorter interval if so specified by the

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Manufacturer. Lifting accessories shall be thoroughly examined at least once every six months in accordance with SANS 19:2007annex A & E.

- e) All inspection details shall be recorded on register and reported for corrective action to the supervisor or site manager and crane coordinator where applicable.
- f) All lifting machines shall be inspected and load tested after installation or at interval's not exceeding twelve months.
- g) Maintenance procedures should be put in place according to manufacturer's specifications, OHS Act and SANS requirements or work environment.
- h) Records must be on site for inspection purposes.

2.28.2 Lifting Machines used to lift Personnel Carriers(Man cage)

- a) Before using a crane for lifting persons and suspended baskets ensure that:
 - o The hoist rope is free of kinks and other obvious defects.
 - o A means have been provided to prevent the carrier attachment from becoming detached from the hook.
 - o Multiple part lines are not twisted around one another.
 - o No slack in the wire ropes.
 - o All ropes are properly seated on the drums and on sheaves.
 - o A dummy lift is conducted prior to lifting persons.
 - o A meeting with all parties involved prior to lifting persons.
- b) The crane operator must never leave the crane control station if he lifts people.
- c) Crane operator to ensure that all safety devices are operational
- d) The required equipment necessary to perform an emergency rescue shall be available throughout the lifting operation.
- e) All operations should be proceeding gently with low speeds.
- f) A rigging study shall be prepared.

2.28.3 Personnel Carriers

- a) All carriers shall be approved by the Department of Labour Inspector before use.
- b) The carrier, suspension system, attachment points and any carrier motions controls shall be checked before use by the supervisor/rigger.
- c) The checks are to identify conditions that have been specifically indicated by the carrier manufacturer, or competent person, as potentially creating a hazardous operating condition.
- d) The checks shall cover at least those items listed in annexure A of this procedure, and the form shall be signed by the supervisor and all parties involved. Any conditions found to be unsatisfactory shall be corrected before persons are lifted. Major repairs shall be subjected to approval by the Chief Inspector.
- e) The crane operator must be competent in lifting of man cages
- f) Continuous Radio communication.
- g) The lifting shall be done under controlled conditions under the direction of a competent and appointed person.
- h) Shall not be used in high winds, storms which can affect the safety of persons.

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- i) Use guide ropes where possible.
- j) Ensure that you take measurements before taking man cages through openings to prevent crushing or entanglement.
- k) Employees shall not stand or work from the handrail or side protection.
- l) Gas cylinders not to be lifted in man basket with personnel
- m) Man cages must be properly earthed if welding is taking place from them.
- n) The following must be displayed on the man cage: Name and address of manufacturer, year of construction, type, identification number, dead weight of the suspended basket, rated capacity of the suspended basket and maximum number of persons permitted in it,
 - o Must be painted in a conspicuous colour (yellow)
- o) Hook-up points must be identified.

2.29 Lifting Tackle

2.29.1 Lifting Tackle Identified on Register

- a) All lifting tackle are numbered / marked and identified on register.
- b) All lifting tackle shall be recorded on a register and inspected by the appointed competent person every three months.
- c) Damaged lifting tackle to be discarded, removed from site and recorded on register.
- d) Colour coding to be implemented as per site requirements to identify quarterly inspections.
- e) A discarding of lifting tackle system to be put in place

2.29.2 Maximum Load Markings

- a) Maximum permissible working loads shall be clearly and conspicuously marked on lifting machines, lifting tackle spreader beams, gantries, A frame gantries by means of indelible signs.
- b) Slings must be stamped appropriately on their ferrules or steel washers should be attached for identification, other tackle such as d-shackles, etc. the identification number shall be stamped.

2.29.3 Hooks

- a) All hooks must be marked (three punch marking method) and entered on a register by the competent person or designated contractor.
- b) Where the hook spread is more than 5% of the original opening as a result of spreading it shall be replaced.
- c) All hooks shall be fitted with safety latches which shall not be removed.

2.29.4 Lifting Machines and Tackle Supplied by a Contractor

All Lifting machines and tackle supplied by a contractor shall not be used unless the equipment is supplied with a valid Test or Conformance Certificate reviewed by the Supervisor. If this certification is not available, then the lifting equipment must be

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removed and marked "UNSAFE-NOT TO BE USED" or enter into a Section 10(4) agreement.

Contractor to provide a crane safety management plan

2.29.5 Textile or Webbing Slings

All slings manufactured from manmade fibre yarn, such as polyester, and include endless round slings (ERS) and flat woven webbing slings shall comply with SANS 94:2003 also EN 1492:2001 Part 1 and 2. Slings to be inspected every 3 months as per DMR 18 (10) (e)

2.29.6 Steel Wire Slings

All slings purchased must comply with SANS requirements. Test certificates must be supplied for individual slings. Slings to be inspected every 3 months as per DMR 18 (10) (e)

2.29.7 Ferrules

Only slings with Ferrules must be used, i.e. Afgrip aluminium ferrule or Super loop ferrule.

NOTE: Super loop ferrules are normally used on slings, larger than 38mm up to 50mm diameter.

2.29.8 Additional Care on Steel Wire Ropes and Fiber Slings

Fibre Core Ropes must not be used at operating temperatures exceeding 150°C.

For use in circumstances involving excessive heat, wire rope slings should always be made of IWRC (Internal Wire Rope Core) rope having a wire rope core. For wire rope, the radius of bend should not be smaller than five times the diameter of the rope.

2.29.9 Polyester Webbing Slings

Two types, namely endless round or flat-woven webbing slings, manufactured from polyester yarn are to be used for applications. These slings are colour coded according to SANS 94-1:2003/ EN 1492-1:2000 to identify their Working Load Limit (W.L.L.) and should be marked appropriately.

2.29.10 Quality Requirements

- a) All webbing slings shall conform to SANS 94-1:2003/ EN 1492-1:2000
- b) Only duplex and no single layer slings to be used.
- c) Colour coded to standard SANS 94-1:2003/ EN 1492-1:2000
- d) Manufactured by SABS, BS or ISO 9001 certified manufacturer.
- e) Factor of Safety = 7:1.

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2.29.11 Marking and Identifications of Webbing Slings

Colour Coding

	WLL of Working load limits in tonnes sewn webbing component	Colour of sewn webbing component
	1,0 2,0 3,0 4,0 5,0 6,0 8,0 10,0 Over 10,0	Violet Green Yellow Grey Red Brown Blue Orange Orange

- a) Round slings and Flat Web Slings.
- b) Markings shall be directly on to the outer sleeve or on a label attached to the outer sleeve of the slings.
- c) Slings shall be colour coded to indicate their working load limit.
- d) SANS 94-1:2003/ EN 1492-1:2000 requires that the material from which the sling is constructed will be identified by the colour of the label, which specifies a blue label for polyester Slings.
- e) It is important to identify the different qualities, as they are affected differently by chemicals etc, as will be outlined later.
- f) The marking of the sling shall include at least the following:
 - the working load limit, in straight lift;
 - the material of the webbing, i.e. polyester, polyamide, polypropylene;
 - grade of fitting;
 - the nominal length in meters;
 - the manufacturer's name, symbol, trade mark or other unambiguous identification;
 - the traceability code;

2.29.12 Traceability Code

The traceability code, which is to be included in the marking, shall enable at least the following basic elements of the manufacturing record to be traced:

- Identification of webbing;
- Identification of manufacturer's control;
- Identification and grade of fittings.

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2.29.13 Chain and Chain Slings

- a) **Quality requirements:** Only short link SANS 50818-4:2007, Grade 8 alloy quality chain should be used for any slinging application.
- b) Test Certificates should be issued by the manufacturer or his appointed distributor.
- c) Slings must be fitted with identification tags that remain legible and intact during the operating life of the sling. Heavy - duty steel washers are recommended, stating WLL as well as identification number for traceability.
- d) **Measuring** – Chain slings should be measured individually for wear and elongation with a vernier and measuring should be conducted over both planes of a link. Measurements must be documented and records kept for the usable life of the chain sling.
- e) **Storage:** When chains are not used, chain slings should be cleaned and stored properly in a designated place.
- f) **Heat Conditions:** Alloy chain can safely operate within a temperature range of 40° to 400°C maximum chain temperatures.

2.29.14 Sling Hooks

- a) Sling hooks shall be of similar quality and size of the corresponding chain.
- b) All hooks shall be fitted with safety latches, these latches shall not be removed and shall function properly.(self-locking)
- c) The user shall not weld on to or repair a hook.
- d) Markings shall be stamped in accordance with the manufacturer's instructions if necessary.

2.30 Shackles

2.30.1 Characteristics of Shackles

Only shackles conforming to SANS 2415 shall be used.

Identity name or brand size and W.L.L. and trace ability mark shall be clearly stamped or embossed.

2.30.2 Selection of Shackles

- a) W.L.L shall be equal to that of sling used with or adequate to lift load.
- b) Shackles shall be designed to take the load between the centre of the pin and the bearing point in the crown.
- c) Know the dimensions of lug or load attachment points, as shackles must be large enough to swivel in the direction of the load and suitable to pass through end chain link or other attachment.
- d) Alloy shackles have pins that are one size larger in diameter than the body of the shackles whereas, untested shackle pins are normally the same

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diameter as the body. Shackle bodies and pins are not supplied separately and original pins should never be replaced with commercial bolts or nuts.

2.31 Eyebolts

2.31.1 Types of Eyebolts

- a) **Eyebolt with Link:** Designed for both axial and angular loading. Capacities up to 6000 kilogram with thread sizes of 20-48 mm.
- b) **Collar Eyebolt:** Designed for both axial and angular loading in capacities up to 25000 kilograms. Corresponding threads 8 to 72 mm.
- c) **Collarless Eyebolts:** Design for axial lift only.
- d) **Dynamo Eyebolt:** Designed for axial loading only in capacities up to 10000 kilograms. Corresponding threads 12 to 52 mm.
- e) Only straight lifts no side loading allowed.

2.31.2 Marking: Shackles Eyebolts, Eye nuts and Swivels

- a) The following information shall be permanently and legibly marked on the above types of equipment.
- b) Identification mark
- c) W.L.L.
- d) Quality i.e. grade
- e) Screw thread size (eyebolts and eye nuts)

2.31.3 Inspection of Lifting Tackle

2.31.3.1 Frequent Pre-use Inspection

- a) The following information is given as a guide to all concerned on the methods and requirements of lifting tackle inspection.
- b) Before slings or components are inspected, they must be cleaned and free from dirt and grease. Inspection should take place in a well-lit area and slings must be laid out properly to be able to inspect the sling and all the components completely.
- c) This is purely a visual inspection by stores before issuing, or by the operator before use, to ensure that no obvious damage has occurred during a previous lift or as a result of malpractice or overload. All operators must be trained to identify damage or distortion, cuts, bends, nicks or other irregularities such as unmarked or unidentified slings or components.
- d) On receipt by the stores, after use, lifting gear will be visually inspected, if serviceable, will be returned to storage racks.
- e) All items are to be inspected and check sheets must be completed as per relevant work instructions.
- f) All lifting tackle must be inspected at maximum intervals of three months or at shorter intervals if deemed necessary by the competent person.

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2.31.3.2 Inspection of Wire Slings

- a) There must be no more than 5 broken wires in one strand and in one rope lay length or maximum 10 randomly distributed broken wires. Broken wires at neck of ferrule, the sling must be scrapped when the following are observed:
- Any permanent kinks, crushing or bird caging.
 - Damaged, worn, corroded, bent ferrules or other end fittings.
 - Any crushing, flattening or stretching of the rope.
 - Loose cracked, bent or distorted ferrules.
 - Severe rust of rope or end fittings. Also, inner core corrosion.
 - Wear – max. 10% of nominal diameter
 - Core failure, protrusion or collapse.

2.31.3.3 Inspection of Polyester Webbing Slings

- a) Polyester round and flat webbing slings shall be removed from service if damage such as the following is visible and shall only be returned to service if and when approved by the competent person
- b) **Check for:**
- Acid or caustic burns.
 - Melting or charring of any part of the sling.
 - Holes, tears, cuts or snags.
 - Broken or worn stitching.
 - Knots in any part of the sling.

2.31.3.4 Inspection for Fraying or loose Fibres

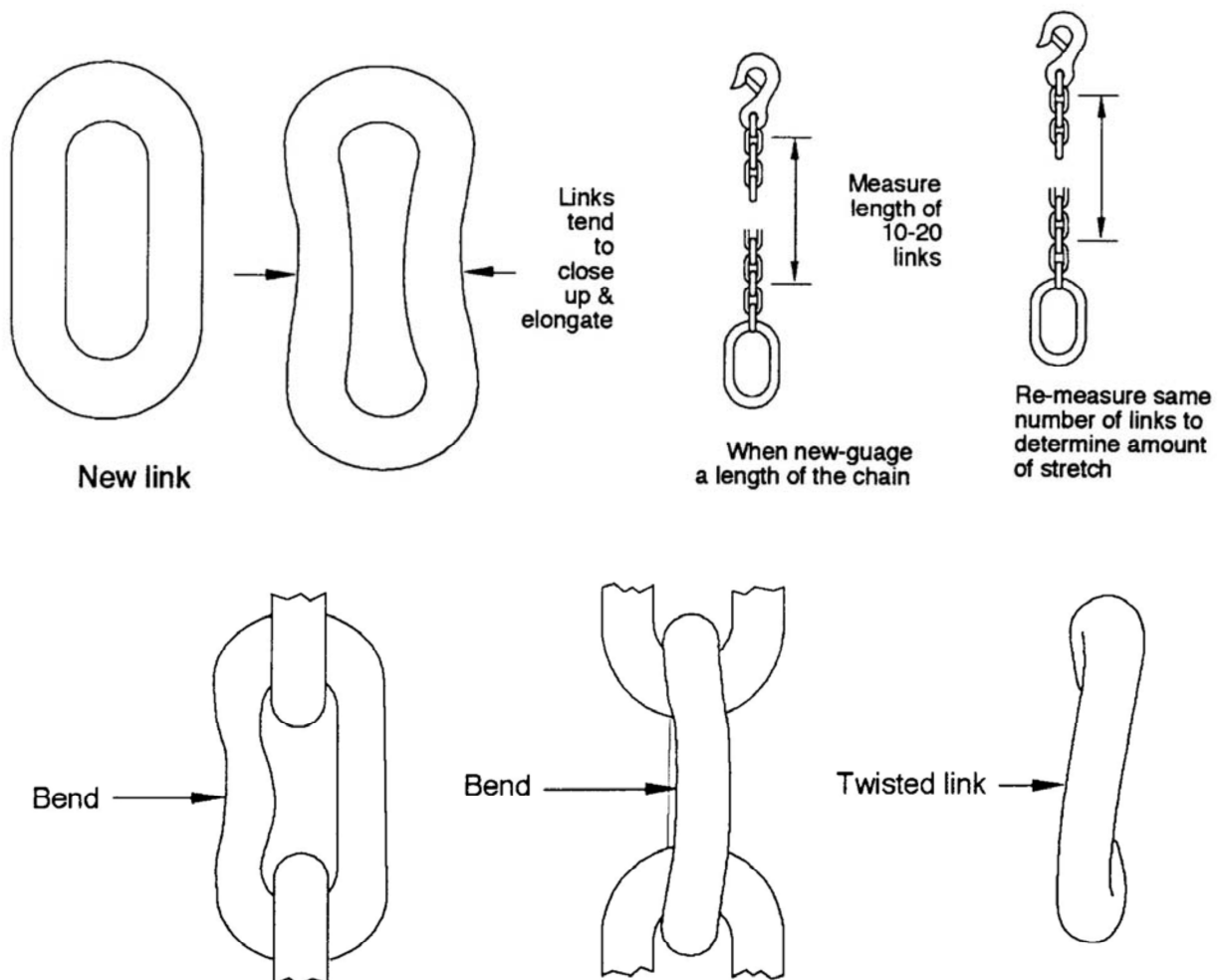
- a) Other visible damage that causes doubt as to the strength of the sling.
- b) If slings are damaged, they must be removed from use/service.

2.31.3.5 Inspection of Chain Slings

- a) Check Individual Links for:
- Wear, i.e. inter-link and side barrel wear. Links should be collapsed individually to determine if wear has occurred in the inter-linking area. Consult manufacturers' catalogue to determine chain wear allowances, which is calculated at a maximum of 15% of original diameter.
 - Nicks and gouges. This type of damage is caused by sharp-cornered-loads, dropping loads onto chains, and general abuse.
 - Stretched or elongated, individual links or sections of the chain: Stretch is caused by overloading - that is direct overloading because of an excessive mass being lifted or indirect overloading because of shock loading or acute angles.
 - Twisted or bent links: This type of damage is caused mainly by sharp-cornered-loads.

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- Welding and hot metal splatters cause excessive damage to chains and must be avoided.
- Heat damage: Chains that work in extreme heat environments should be specifically checked for discoloration and stretch, which is an indication that chains are being over-heated.



When measuring the same chain sling again after use and it shows a stretch of more than 3%, take it out of service.

2.31.3.6 Inspection of Chain Coupling Links

Should be checked to ensure that the two halves are free to move and if any jamming occurs, the Coupling Links should be rejected. Coupling Links, pins and studs should also be checked to ensure that they are properly located and undamaged. Furthermore, Coupling Links should be checked generally for nicks and gouges, wear, possible stretch and weld or hot metal splatter.

2.31.3.7 Inspection of Hooks

a) Hooks shall be inspected for:

- Wear in the eye of the hook.
- Wear in the saddle of the hook.

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- Excessive throat opening - max allowed 5%. If a 3-point pop marking system of hooks is used, hooks should be marked prior to the hook being put into service. This will assist the Inspector to determine whether a hook has opened up or not, and is recommended for crane hooks
- Side bending or twisting of hook.
- Safety latches should operate correctly.
- Hook to be inspected for cracks.

2.31.3.8 Inspection of Terminal Fittings

Other terminal fittings, such as oblong master links, coupling links, lifting lugs, or any other terminal fitting used in conjunction with chain slings should be checked for wear or any other visible damage.

2.31.3.9 Inspection of Natural Fiber Ropes (Manilla)

a) Inspection of Ropes and Fibre Slings:

- In-service rope shall be inspected every 30 days under ordinary conditions and more frequently if used in critical applications, such as to support scaffolding on which men work.
- Inspection consists of an examination of the entire length of the rope for wear, abrasions, powdered fibre between strands, broken or cut fibres, displacement of yarns or strands, variation in size or roundness of strands, discoloration, and rotting.
- To inspect the inner fibres, the rope should be untwisted in several places to see whether the inner yarns are bright, clear, and unspotted. If exposed to acids, natural fibre ropes, such as manilla, should be scrapped or retired from critical operations as visual inspection will not always reveal acid damage.

2.31.3.10 Inspection of Shackles

Shackles should be inspected for

- a) Marking and Identification also S.W.L.
- b) Whether the pin was replaced by a bolt and nut.
- c) Whether the pin is worn, bent, or if the thread is not damaged.
- d) Distorted or bent body or whether the shackle has opened up.
- e) Wear in the bow of the shackle – max 10% reduction in diameter.
- f) Any surface damage such as nicks gouges or cracks.
- g) Whether the pin screws in easily and properly.
- h) Check alignment of the holes on the opposite sides of the shackle.
- i) Heat exposure.

2.31.3.11 Inspection of Eyebolts

Inspect for the following

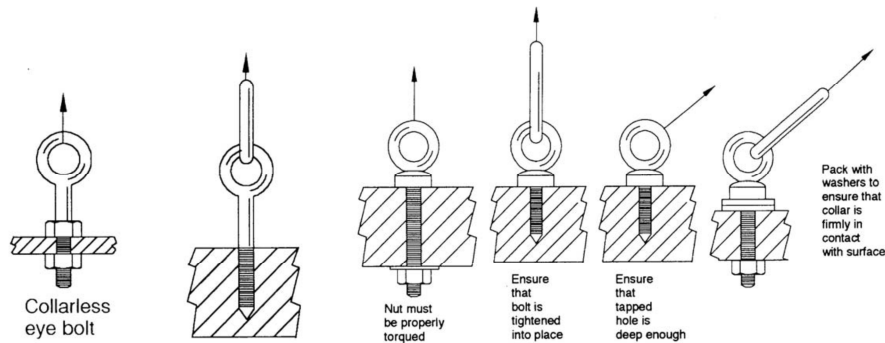
- a) Identification Number to be clearly visible.
- b) Safe Working Load (S.W.L.) to be clearly visible.
- c) Size to be clearly visible.

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- d) Distinguishing Number to be clearly visible.
- e) Distortion / wear on the eye / body.
- f) Wear on the eye / body (excess of 10% of any sectional dimension).
- g) Distortion / Deformation of threaded pin.
- h) Heat exposure.
- i) Wear, cross threading of pin.
- j) Any other visible damage that causes doubt to the strength of the eyebolt.

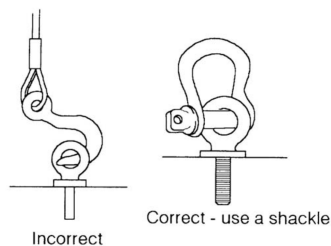
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- k) **Note: S.W.L, Size and Distinguishing Number are cast during eyebolt manufacture.**



Collarless Type

Collar Type



2.31.3.12 Inspection of Eyebolts

Inspect for the following

- Identification Number to be clearly visible.
- S.W.L. to be clearly visible.
- Size to be clearly visible.
- Distinguishing Number to be clearly visible.
- Distortion / wear on the eye / body. (excess of 10% of any sectional dimension).
- Cross threading / wear on thread.
- Heat exposure.
- Any other visible damage that causes doubts to the strength of the eye nut.

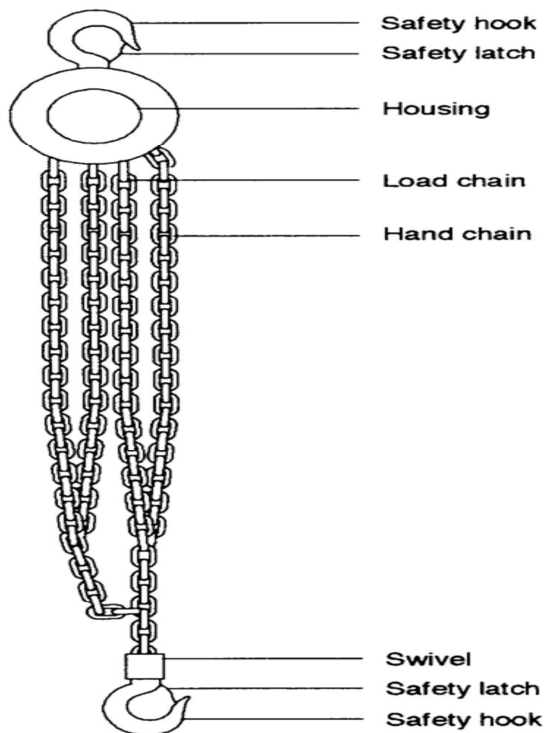
2.32 Chain Block

The chain block is a lifting device equipped with two separate chains: the lifting chain and hook, and a continuous chain, the hand chain (messenger chain). This chain lifts or lowers the load chain through a gearbox in the housing. A hook on top of the housing is used to suspend the chain block.

2.32.1 Uses of the chain block

- Lifts a load vertically;
- Lifts and suspends a load;
- Lifts and moves a load with the aid of a crawl and beam.

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2.33 Lever Hoist

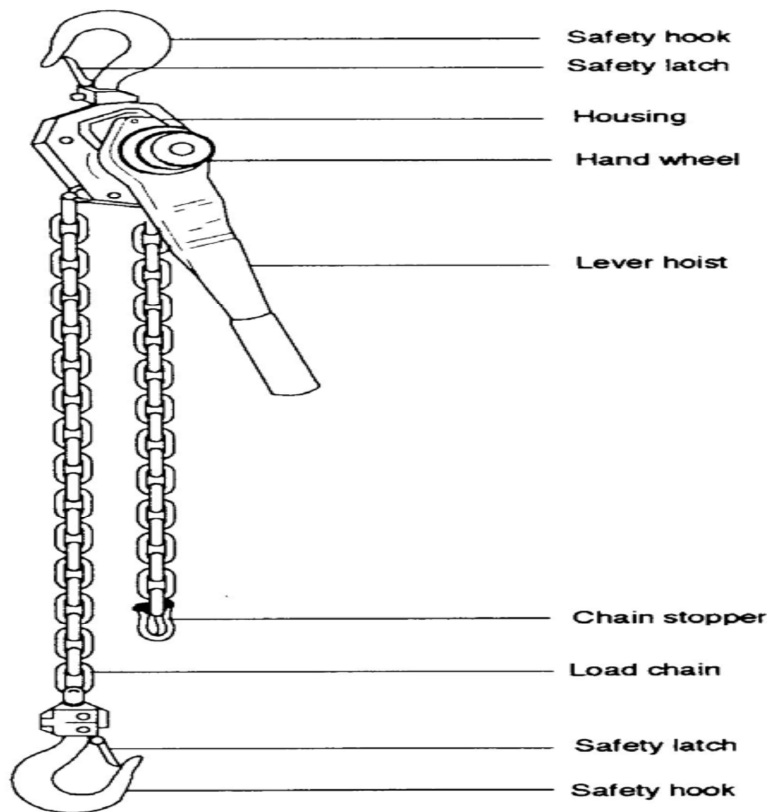
This hoist is operated by a handle and not by a chain as on the chain block. The body is relatively small with a hook fitted to it. There is a small hand wheel on the lever, which allows fast lifting or lowering of the load chain when unloaded.

The lever hoist works on a ratchet principle and the lever must be moved from stop to stop before the load will be moved.

2.33.1 Uses of the lever hoist

- a) Lifts a load vertically;
- b) Shifts a load horizontally;
- c) Pulls pipes and other constructions apart or together;
- d) Secure loads on a truck.

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2.34 Handling the Load

2.34.1 Introduction

- a) All lifting of loads should be regarded as a critical operation and should only be handled by suitably trained operators.
- b) Selection Criteria:
 - Lifting tackle, for any particular application, shall be best suited to that application.
 - Consideration should be given to:
 1. Size of the load.
 2. Type of load.
 3. Mass of the load.
 4. Adequate lifting points or lugs.
 5. Appropriate Factor of Safety.
 6. Safe connection or attachment to load.
 7. Operator Safety.
 8. Compatibility of all equipment in so far as strength and size.
 9. Operating conditions such as heat, shock loading, etc.
 10. Adverse weather conditions.

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2.35 Safe Use of Hooks

- a) Do not overload.
- b) Do not side load.
- c) Do not tip or point load.
- d) Do not subjected to excessive heat, acids or chemicals.
- e) Do not shock or impact load.
- f) Do not load on safety latch.
- g) Hooks must:
 - Be cleaned after use of cement, chemicals dust etc. – mainly self -locking hooks.
 - Be properly loaded in straight tension through the eye and saddle of hook.
 - Be positioned correctly – facing outward on lifting lugs.
 - Be fitted with safety latches to operate correctly.
 - Be attached correctly to sling.
 - Not be forced into a lug or lifting point.
 - Not be welded or repaired if damaged or bent.

2.36 Safe Use of Shackles

- a) Do not replace the shackle pin with a bolt. A load will bend the bolt.
- b) Do not allow shackle to be pulled at an angle -the legs will open up. Pack the pin with washers to centre the shackle.
- c) Do not use Screw Pin Shackles if the pin can roll and unscrew.
- d) Attach multiple sling legs correctly.
- e) Never side-load a “D” shackle. Take consideration of angle between legs, e.g. loading in shackle must be same as in sling leg.
- f) Connect shackles correctly to eyebolts.

2.36.1 Additional Care of Shackles

- a) Bow shackles are in general used where more than one attachment is to be made to the body, or to allow freedom of movement in the plane of the bow.
- b) Dee shackles are in general used to join two pieces of lifting equipment.
- c) It is desirable to use a shackle with a small jaw opening as it is consistent with adequate articulation of the connection.
- d) Care should be taken to ensure that at all times each shackle is fitted with its correct individual pin.
- e) Ensure, where appropriate, that the pin is correctly screwed into the shackle eye; i.e. tighten finger tight and then the lock using a small Tommy bar so that the collar of the pin is fully seated on the shackle eye. Ensure that the pin is of the correct length so that it penetrates the full depth of the screwed eye and allows the collar of the pin to bed on the surface of the drilled eye.
- f) Shackles should be fitted to the load in a manner that allows the shackle body to take the load in a true line along its centre line; and not in such a way that bending loads are induced, other than those for which the shackle is designed.

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- g) Avoid applications where due to movement (e.g. of the load or rope) the shackle pin can roll and possibly unscrew.

2.36.2 Safe Use of Eyebolts

- a) Select the correct size.
- b) Ensure correct thread form and diameter.
- c) Ensure thread not damaged or shank bent

2.36.3 Side loading of eyebolts

- a) It is essential to note that with both collar eyebolts as well as link eyebolts the;
 - S.W.L. decreases as the angle to the vertical increases. Loading: at 90° angle to horizontal. Link Eyebolts – reduce S.W.L. to no more than 60% of W.L.L. Collar Eyebolt – reduce S.W.L. to no more than 25% of W.L.L.
 - Link Eyebolts can be used at rated W.L.L. up to 15° to the axis of the eyebolt thread. Thereafter the S.W.L. decreases in proportion to the increase in the angle.
 - Collar Eyebolts may be used at their rated W.L.L. in a straight lift. For angle loading, the appropriate de-rating factors must be used.
 - shackles are to be used for connection to eyebolts
 - Extension pieces may not be used and spacers may also not be used with eyebolts or eye nuts.

2.37 Weld-on Lifting Points

These must be designed correctly for correct use. A reviewed and verified engineering drawing must be produced and the lug manufactured and attached in accordance with a fast track process with interventions for statutory lifting equipment. Must be certified by a Civil / Structural Engineer

2.38 Issue and Receipt of Lifting Equipment

- a) On request, equipment will be removed from rack and inspected.
- b) Equipment is on register in the Rigging Store. The issue/receipt book and form to be completed by requester.
- c) Equipment to be inspected and signed back on return to Rigging Store
- d) Equipment found to be damaged or un-serviceable to be tagged and removed from service

NOTE: Incident investigation to be initiated should equipment be damaged.

2.39 Maximum Lifting and Rigging Loads for Competent People

- 2.39.1** Work can be done by a competent person who has been trained and assessed against the Sling Loads Unit Std (U/S No 12481)
- 2.39.2** Competent person other than a Rigger Artisan may rig and lift any equipment up to 5 000kg in a vertical lift. (Straight lift)
- 2.39.3** Any equipment exceeding 3 000kg which needs to be lifted at an angle may only be done by a Rigger Artisan (Red Seal).

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3 Supporting Clauses

Index of Supporting Clauses

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3.1 Scope

- a) This procedure describes the definitions, legal requirements, types, safe operation, inspection, maintenance, documentation and control of Lifting Equipment and the safe use and maintenance thereof.
- b) Subjects covered include safe systems of work, management, planning, selection, inspection, testing, examination, operation and maintenance of cranes and lifting tackle.
- c) This procedure acknowledges and takes cognisance of existing legal requirements pertaining to Lifting Machines and Lifting Tackle, and in particular to the Driven Machinery Regulations and Construction Regulations of the Occupational Health and Safety Act, Act No. 85 of 1993.

3.1.1 Purpose

This procedure covers the safe use and handling of lifting machines and tackle.

3.1.2 Applicability

This standard shall apply throughout the Capital Group Division.

3.2 Normative/Informative References

Parties using this procedure shall apply the most recent edition of the documents listed below:

3.2.1 Normative

- 3.2.1.1 **32-95** Procedure for the effective management of Safety, Health and Environmental related incidents
- 3.2.1.2 **32-166** Earthing Code of Practice for the Application of Earthing and Bonding Gear on High Voltage Systems
- 3.2.1.3 **32-418** Working from heights
- 3.2.1.4 **32-62** Psychometric assessment
- 3.2.1.5 **32-136** Construction safety

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3.2.1.6 **ISO 9001: 2008** Quality Management Systems

3.2.1.7 **OHS Act** Occupational Health and Safety Act; Act 85 of 1993.

3.2.1.8 **SMAT** Safety Management System Training Requirements

3.2.2 Informative

BS 7121-1:2006 Code of practice for safe use of cranes Part 1: General.

SANS 4302 2002 Cranes-Wind Loads Assessments.

SANS 19:2007. The Inspection, Testing and Examination of Mobile Cranes.

SANS 578-2008/ISO 10245-2:1994 Cranes-Limiting and indicating devices Part 2: Mobile cranes.

SANS 4305:2007/ISO 4305:1994 Mobile cranes-Determination of stability.

SANS 1595:2003 Forged steel lifting hooks for use with steel chains of strength grade M(4), P (5). S (6), T (8) and V (10)

SANS 1596::2007 Drop forged eyebolts and nuts for lifting purposes.

SANS 2415:2005/ISO 2415:2004 Forged shackles for general lifting purposes-Dee shackles and bow shackles.

SANS 3077:2008/ISO 3077:2001 Short-link chains for lifting purposes.

SANS 94-1:2003/EN 1492-1:2000 Textile slings - Safety Part 1: Flat woven webbing slings, made of man-made fibres, for general purpose use

SANS 94-2:2003/EN 1492-2:2000 Textile slings - Safety Part 2: Round slings, made of man-made fibres, for general purpose use

SANS 3056:1986/ISO 3056:1986 Non-calibrated round steel link lifting chain and chain slings - Use and maintenance

SANS 4778:1981/ISO 4778:1981 (SABS ISO 4778) Chain slings of welded construction - Grades M(4), S(6) and T(8)

SANS 7531:1987/ISO 7531:1987 (SABS ISO 7531) Wire rope slings for general purposes - Characteristics and specifications

SANS 4301-2:2002/ISO4301-2:1985 Lifting appliances-classification-Part 2 Mobile cranes

SANS 4301-2:2002/ISO4301-2:1985 Lifting appliances-classification-Part 3 Tower cranes

SANS 4309:2003 (E) Crane Wire ropes Code of Practice for care Maintenance (including installation) examination and discard.

BS EN 14502-1:201 Cranes –Equipment for the lifting of persons

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SANS 500:2009 Inspection, Examination and testing of manually operated chain blocks and lever hoists in use.

SANS 687:2008 Inspection and testing of non-fixed lifting attachments.

SANS 1594:2007 Manually operated chain blocks

SANS 1599-1:2006 Cranes part1: Cantilever/Slewing jib cranes

SANS 10307:2006 Cranes lifting and suspended equipment-Support Documentation and Training.

SANS 10375:2005 The Inspection, Testing and Examination of overhead cranes.

3.3 Definitions

3.3.1 Lifting Tackle

Includes chain slings, rope slings, rings, hooks, shackles, swivels, spreaders or similar appliances
Includes

3.3.2 Lifting Machines

This is a power driven machine, which is designed and constructed for the purpose of raising or lowering a load, or moving it in suspension, and includes block and tackle, hoists, crane, lift trucks or jib cranes, but does not include an elevator, escalator, goods hoist, or builders hoist.

3.3.3 Responsible Person

The appointed person by qualification, legal requirement and position.

3.3.4 Certification of Lifting Equipment

Certification issued by the Supplier or Manufacturer stating, where applicable, the test load applied by the manufacturer prior to supply or to state whether the product was made to a specific standard, and conforms to that standard.

3.3.5 Competent to Operate Lifting Equipment

A person who has received the necessary instruction, and training, to use the specific lifting equipment. Such a person may be authorised only to use certain categories of Lifting Equipment, dependant on his training and qualification.

3.3.6 Rigger

A person who has completed an apprenticeship and passed a trade test as a Rigger.

3.3.7 Man cage/Suspended basket (Cradle/Carrier)

Means a platform enclosed on all sides but open at the top, designed for the purpose of raising and lowering of persons by means of a lifting machine

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3.3.8 Recommended Maximum Load

This is the recommended maximum load to be raised, lowered or suspended, as stipulated by the Manufacturer for a specific type and size of product. This load depends on the angle of application as well as the method of slinging.

3.3.9 Proof Load

The manufacturers actual test load applied to certain new equipment such as chain prior to dispatch. This load is normally 2 times the W.L.L. for Lifting Tackle and 1.5 times for Lifting Machines.

3.3.10 Factor of Safety (F.O.S.) Design Factor

Is the ratio between the Working Load and the Minimum Break Load of a product, and the various factors for different products are specified in the OHS Act, DMR 18 10 (d).

3.3.11 Minimum Break Load (M.B.L.)

The load or force applied to a new piece of equipment, normally on a test bench, with the load taken up gradually, until failure occurs.

Example: If a sling has a F.O.S. of 5 and the recommended W.L.L. is 6 ton, the average M.B.L. will be approximately 30 tons. (5x6)

3.3.12 Certificate of Test or Certificate of Conformance

A Certificate issued by the Manufacturer or his Appointed Distributor listing all relevant details of a product and stating the specific proof load which was applied to the individual product except for webbing slings where batch testing, according to International Specifications are acceptable and a Certificate of Conformance or Conformity is issued.

NOTE: Polyester webbing slings, both ERS and flat type, due to the method of construction and nature of the material, do not lend themselves to proof load testing. This could do more harm than good by stretching the yarns and bursting the cover stitching. They are therefore subjected to selective batch testing and strength tests during manufacturing to ensure a minimum factor of safety of 7 if manufactured to BS EN 1492 standards and a Certificate of Conformity with this Standard is issued.

3.3.13 Centre of Gravity

The point at which a load, if it were suspended from, would be perfectly balanced. The loads centre of gravity must always be directly under the crane hook and below the lifting points.

3.3.14 Critical Lifts are defined as:

- **Any lift that utilizes more than one crane or hoisting device.** - Examples include two different cranes (tandem lift), a crane and a tele-handler (forklift), both the auxiliary and main boom of a single crane. Using a come-a-long (turf) to balance a load for lifting would not typically make the lift critical.
- **Any lift weighing in excess of 20 tons** – this would include the weight of a stored jib (if applicable) the block & hook, all rigging components, total weight of the load being lifted and the load line weight.

85% of Load Chart – lifts that include the total weight to be in excess of 85% of the load chart taking into consideration the current configuration of the crane. Note that an operator may lift a load at 75%, slew then boom down and be in excess of the 85% rule;

Any Lift involving a crane suspended work platform (Man Cage) – Using a crane to lift a worker or workers to an elevated position by means of a personnel basket or man cage. The need to suspend personnel by using a basket or man cage lifted by a crane must be the last

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resort. A more feasible means of performing the work safely shall be considered first before lifting personnel to elevated areas with a crane.

- **Any lift over critical operating and/or process equipment** – this would include lifting over electrically energised systems, tanks and operating processes.
- **Multiple Lifting Devices** – any lift in excess of 20 tons. Total weight includes load, hoist line weight below the tip of the boom, Weight of the Jib installed or stored, load block weight and all rigging equipment (shackles, slings, lifting beams, etc);
- **Load Transfer**
Transferring / shifting the load vertically by means of a secondary lifting machine to place the load into position.
Night Lifting
In most cases lifts shall be conducted during day light.

3.3.15 Strong breeze

Large branches in motion; whistling heard in telephone wires; umbrellas used with difficulty > 38 ≤ 50 km/h or > 10, 6 ≤ 13,9 meter/second.

3.4 Records

3.4.1 Test and Inspection Records

- All original copies of the Certificates of Test and Conformance from the Supplier must be kept by the contractor.
- Photo Copies of these certificates shall be kept by the Group Capital BU or the contractor on site and in the crane for verification.
- All Inspection Records, if held by an appointed Service Provider, must be available on request for scrutiny or verification by the SHE Department
- All lifting machine repairs and test records shall be kept for the life of the machine.
- Records of all Lifting Tackle shall be retained for at least five years.

3.4.2 Training records

All training records to be kept at the relevant training department and safety file of contractors for 3 years.

Crane Operator training certificates and letter of appointment shall be in the crane

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3.5 Abbreviations

- 3.5.1 **BU:** Business Unit
- 3.5.2 **CE:** Chief Executive
- 3.5.3 **CoC** Certificate of Compliance
- 3.5.4 **DMR:** Driven Machinery Regulations
- 3.5.5 **EDC:** Eskom Documentation Centre
- 3.5.6 **ERS:** Endless Round Sling
- 3.5.7 **ECSA:** Engineering Counsel of South Africa
- 3.5.8 **FOS:** Factors of Safety
- 3.5.9 **GMR:** General Machinery Regulation
- 3.5.10 **LME:** Lifting Machine Entity
- 3.5.11 **LMI:** Lifting Machine Inspector
- 3.5.12 **MD:** Managing Director
- 3.5.13 **M.B.L:** Minimum Break Load
- 3.5.14 **M.M.L:** Maximum Mass Load
- 3.5.15 **OHS Act:** Occupational Health and Safety Act
- 3.5.16 **PPE:** Personal Protection Equipment
- 3.5.17 **S.W. L:** Safe Working Load
- 3.5.18 **S.M.L:** Safe Mass Load
- 3.5.19 **SHE:** Safety Health and Environmental
- 3.5.20 **SWR:** Steel Wire Ropes
- 3.5.21 **SABS:** South African Bureau of Standards
- 3.5.23 **TETA:** Transport Education and Training Authority
- 3.5.24 **W.L.L:** Working Load Limited
- 3.5.25 **WRC:** Wire Rope Core

3.5 Process for monitoring

This procedure shall be monitored through regular internal audits.

3.6 Related Documents

None Applicable

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4 Authorisation

This standard has been seen and accepted by:

Name	Designation
H J Steyn	Senior General Manager Construction Management
R Crookes	General Manager Projects – Medupi
A Masango	General Manager Projects - Kusile
P Dukashe	General Manager Projects - Gx Coal Projects
G Bronkhorst	General Manager Projects – Gx Clean Technology Projects
N Hari	General Manager Power Delivery Projects (Acting)
P Governder	General Manager EPMO (Acting)
S Tjabadi	Senior Manager, Quality
R Mamorare	Senior Manager, Facilities
J Naidoo	Senior Manager SHE
P Govender	General Manager, Project Development

5 Revisions

DATE	REVISION	REMARKS
October 2009	0	New Document developed by A Botha
August 2013	1	<p>Revision 1 revised by A. Botha</p> <p>1. Introduction Paragraph 1 added “Lifting Machines and Equipment and Competent”</p> <p>2. 2.1 Employer</p> <p>2.1.3 Added “conduct any rigging tasks”</p> <p>2.1.4 Added “training should be conducted by a TETA accredited training provider”</p> <p>2.1.6 “Added a competent and appointed incident /accident investigator”</p> <p>2.1.7 Added “2.1.7 That all lifting machine shall be inspected and tested by a Lifting Machine Inspector(LMI) accredited by The Engineering Council of South Africa(ECSA) and affiliated with a Lifting Machine Entity (LME) registered by the Department of Labour”</p> <p>3. 2.2 GMR 2(1)/added “CR 6.1” Added</p> <p>2.2.3 that he/she appoint a competent crane coordinator as per SANS 12480</p> <p>2.2.4 Ensure that all lifting machines are inspected before entering the site by the crane coordinator</p> <p>2.2.5 That the Contractor provides a crane safety management plan.</p> <p>Added</p> <p>4. 2.3 The Crane Coordinator</p>

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		<p>2.3.1 The crane coordinator shall coordinate the sequence of operations of tower and other cranes on those sites having more than one crane, to prevent the collision of the cranes, components and loads</p> <p>2.3.2 In the interests of safety, the appointed person shall arrange the lifting programme such that no driver has to be in attendance at the control station or actually operating the crane for an unreasonably long period, taking into account environmental conditions.</p> <p>2.3.3The driver shall have breaks from the working activity in line with those of other personnel on the site.</p> <p>2.3.4 Shall ensure that he is in possession of a legal lifting machine register with all lifting machines on site recorded in a register.</p> <p>2.3.5 Inspect all lifting machines before entering an Eskom site</p> <p>2.3.6 Ensure that all documentation is valid(load test, rope test hook block inspections, 6 monthly inspections, operator certification, applicable drivers licence and daily crane inspections).</p> <p>2.3.7 Ensure that he is in possession of the latest site crane lay out.</p> <p>2.3.8 To arrange at least two crane coordinators meetings per month on site.</p> <p>2.3.9 Shall ensure that all contractors appoint competent crane coordinators.</p> <p>2.3.10 Shall Attend all lifting machine and tackle incident and accident investigations.</p> <p>2.3.11 Conduct monthly legal compliance audits on lifting machines and tackle.</p> <p>2.3.12 Attend weekly contractor integration meetings.</p> <p>2.3.13 Shall verify all rigging studies.</p> <p>2.3.14 Daily site inspections.</p> <p>2.3.15 Sign off tower crane erecting applications.</p> <p>2.3.16 Ensure that all operators are operating cranes with the correct operating codes.</p> <p>2.3.17 Shall be involved with the crane route planning.</p> <p>2.3.18 Must develop a plan on how he is going to manage lifting machines and tackle on site.</p> <p>2.3.19 Only sites where there are Tower cranes and</p>
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		<p>mobile cranes must appoint a crane coordinator.</p> <p>5. Numbering changed from 2.3 to 2.4 The added "Lifting Machine" Supervisor</p> <p>2.4.3 Added "and certified for the type of crane being operated"</p> <p>2.4.4 added "copies in the crane"</p> <p>2.4.5 New That a working at heights plan is developed when conducting inspections on top of mobile cranes and for tower cranes</p> <p>2.4.14 New. Prior to any critical lift being performed he/she must have a meeting with all parties involved.</p> <p>6. Numbering changed from 2.4 to 2.5 Lifting Machine Inspector Added"(LMI)</p> <p>2.5.2 added " SANS 019"</p> <p>2.5.5 added "the LMI"</p> <p>2.5.6 added " Lifting Machine Entity(LME'S)"</p> <p>2.5.7 New "Conduct a risk assessment before conducting load testing and inspections on site."</p> <p>2.5.8 New "LMI to issue a load test certificate signed by him, his registration number and the registration number of the LME should be on the certificate"</p> <p>2.5.9 added " according to SANS 019"</p> <p>2.5.10 new "He must only conduct load test and inspection on lifting machines and tackle that he is registered for"</p> <p>7. Numbering changed from 2.5 to 2.6 Operator</p> <p>2.6.12 That the crane used to lift people is inspected every 6 months and "load tested (not exceed 50%of crane lifting capacity)".</p> <p>2.6.13 That he/she takes windy, adverse weather and ground stability conditions into consideration '(where required perform a geotechnical study)'</p> <p>2.6.15 That Load Mass is identified, if uncertain, that it be verified or estimated "by a competent person".</p> <p>2.6.16 "New "All controls in the cranes are clearly marked in English"</p> <p>2.6.19 "Number changed "That he/she has visual contact with the Signal man at all times; the signal man must be able to see the operator clearly, to communicate with hand signals "(two way radio communication where required)"</p> <p>2.6.21 "New"That all tower crane operators and mobile crane operators must attend a working at heights training course</p> <p>2.6.22 "New"That he/she is trained to lift a man cage and found competent.</p> <p>2.6.25 New" At no time an operator shall override a crane safety system"</p> <p>8. Numbering changed from 2.6 to 2.7 Rigger, Slinger and Artisan</p>
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		<p>2.7.3 Removed "Eskom"</p> <p>2.7.4 added "up to 5 tons"</p> <p>2.7.10 "New" That a rigging study of all critical lifts are done and approved prior to a lift taking place.</p> <p>9. Numbering changed from 2.7 to 2.8 Training</p> <p>2.8.3 added "with legal as well as Eskom procedures."</p> <p>2.8.7 Added "as per unit standards"</p> <p>2.8.8 added "(red seal)"</p> <p>2.8.9 New "That all tower crane operators, mobile crane operators and inspectors climbing on top of mobile cranes must conduct a working at heights training course by an accredited provider".</p> <p>2.8.10 New "All tower crane operators must be trained to use a fire extinguisher".</p> <p>2.8.11 New "All crane operators must be trained/assessed to conduct tandem lifts".</p> <p>10. Numbering changed from 2.8 to 2.9 Purchasing</p> <p>2.9.4 New "All lifting tackle and Machines must be bought through a reputable provide"</p> <p>11. Numbering changed from "2.9 to 2.10" Planning of the Lifting Operations</p> <p>(c) Planning of the lifting operations should take into account</p> <p>Note:</p> <ul style="list-style-type: none"> • "New" The weight of all lifting attachments to be taken into account when assessing the load on the crane(s). • New "The site of the operation including proximity hazards (power lines etc.)". • New "Adverse weather conditions to be taken in account". • New "Ground stability to be taken into account (geotechnical study)" <p>12. 2.11 New "CRITICAL LIFTS"</p> <p>There are five categories for which a lift can be defined as a Critical Lift; (1) any lift weighing in excess of 20 tons, (2) any lift involving a crane suspended work platform (man cage), (3) any lift over critical operating and/or process equipment and (4) any lift that exceeds 85 % of the crane's load chart (5) any lift that utilises more than one lifting device (Tandem Lift). (6) Load transfers. (7) night lifting.</p> <p>2.11.1 Critical Lifts are defined as:</p> <p>Any lift that utilizes more than one crane or hoisting device which include two different cranes (tandem lift), a crane and a tele-handler (forklift), both the auxiliary and main boom of a single crane. Using come-a-long (turfer) to balance a load for lifting would not typically</p>
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		<p>make the lift critical.</p> <p>Any lift weighing in excess of 20 tons – this would include the weight of a stored jib (if applicable) the block & hook, all rigging components, total weight of the load being lifted and the load line weight.</p> <p>85% of Load Chart – lifts that include the total weight to be in excess of 85% of the load chart taking into consideration the current configuration of the crane. Note that an operator may lift a load at 75%, slew then boom down and be in excess of the 85% rule;</p> <p>Any Lift involving a crane suspended work platform (Man Cage) – Using a crane to lift a worker or workers to an elevated position by means of a personnel basket or man cage. The need to suspend personnel by using a basket or man cage lifted by a crane must be the last resort. A more feasible means of performing the work safely shall be considered first before lifting personnel to elevated areas with a crane.</p> <p>Any lift in close proximity of electrical equipment – this would include energised systems, tanks and operating processes.</p> <p>Multiple Lifting Devices (Tandem Lifts) – any lift in excess of 20 tons. Total weight includes load, hoist line weight below the tip of the boom, Weight of the Jib installed or stored, load block weight and all rigging equipment (shackles, slings, lifting beams, etc.); Night time lifting operations.</p> <p>2.11.2 Rigging Studies</p> <ul style="list-style-type: none"> • A detailed rigging study shall be prepared prior any critical lift. • The rigging study shall include detailed drawings of the crane/cranes, lifting equipment, and load, area of operations and calculations of total weight. • The rigging study shall be approved by an engineer. • The steps of lifting shall be indicated on the lifting plan or drawings <p>13 Numbering changed from 2.9.2 to .2.12 Risk Assessment</p> <p>Added paragraph 1: first line "a task specific" Second line "and risks"</p> <p>New Paragraph: Paragraph 4 "A daily task specific risk assessment shall be conducted prior to any lift"</p> <p>3RD Paragraph second line "safe work procedure" 4th Paragraph ; second line "safe work procedure for"</p> <p>14 Numbering changed from 2.9.3 to 2.13 Safe work procedure.</p> <p>Added "Safe work procedure" second line</p>
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		<p>15. Numbering changed from 2.9.5 to 2.14 Personal Protective Equipment</p> <p>1st bullet new "Personal Protective equipment appropriate for the site and activity is issued (hard hats, eye protection, full body harness, safety boots, reflective vests and hearing protection) where applicable."</p> <p>2nd Bullet added "record"</p> <p>2nd Bullet added "and kept on register."</p> <p>3rd bullet new "That they are trained in the correct, safe use, maintenance and limitations of PPE".</p> <p>5th Bullet new "Records are kept of all PPE issued".</p> <p>6th Bullet new "Damaged or unserviceable PPE must be removed and discard, discarded PPE must be recorded and removed from the register.</p> <p>7th Bullet new "A discarding of lifting tackle system to be put in place"</p> <p>16. Numbering changed from 2.9.5 to 2.15 Use of Personal Protective Equipment Numbering changed from 2.9.5 to 2.15.</p> <p>17. Numbering changed from 2.9.6 to 2.16 Wind Loading</p> <p>Numbering changed from 2.9.6 to 2.16 2.16.2 previous (b) added "or site or activity (2.17) 2.16.6 New "Personal carriers should not be used in winds in excess of 7m/s(25km/h)"</p> <p>2.16.7 New "Movement of the personal carriers shall be done in a slow, controlled cautious manner, with no sudden movements of the crane. The lifting or lowering speed shall not exceed 30 m/min (0, 5 m/s)".</p> <p>18. 2.9.7 Numbering changed to 2.17 Wind-Speed Indicating and Monitoring Devices (Tower cranes and people carriers)</p> <p>Numbering changed from a) to 2.17.1 New "Where fitted, anemometers or other wind-speed measuring devices should have their indicators located in clear view of the crane operator. The device must be inspected daily by the operator and calibrated annually and they should be maintained in good working order". New "2.17.4 Tower cranes operating in close proximity of other cranes will have anti-collision devices installed.</p> <p>19. 2.9.8 Numbering changed to 2.18 Identification of Persons Directing Crane Movement. 2.18.4 New 2.18.4 "All tower cranes shall have two way radio communications between the operator and the banks man".</p> <p>2.18.5 New "Two way radios where applicable should</p>
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		<p>be licenced”.</p> <p>20. Hand Signals Changed to SANS 10296</p> <p>21. Numbering changed from 2.9.9 to 2.19 Access and Emergency Escape</p> <p>22. Numbering changed from 2.10 to 2.20 Machine Guarding.</p> <p>23. Numbering changed from 2.10.1 to 2.21 Proximity Hazards.</p> <p>24. Numbering changed from 2.10.2 to 2.21.2 Overhead Electric Lines and Cables New “d)Contact the Eskom supplier to isolate the power line before working in close proximity of power lines”</p> <p style="padding-left: 40px;">f) Added (BEWARE OF POWER LINES) ii bullet 2 added “fibre ropes to be used as tag lines” f)vi new Ensure that all truck mounted cranes and stringing machines working in close proximity of live conductors are fitted with equipotential foot plates</p> <p>25. Numbering changed from 2.10.3 to 2.21.3 Leaving the crane Unattended New bullet 7 Chock blocks to be used to prevent the crane from moving. New bullet 8 “Tower cranes must be left in free slewing condition when not in operation. New bullet 9 “All tower cranes shall be earthed for lighting protection. New bullet 10 “COC top and bottom DB boards</p> <p>26. Numbering changed from 2.10.4 to 2.21.4 Condition of Lifting Machines</p> <p>27. Numbering changed from 2.10.5 to 2.21.5 Do's and Don'ts of rigging f) New Do not twists load chain or to put knots to shorten chains?</p> <p style="padding-left: 40px;">h) added (conduct a proper risk assessment) x) new x) Never leave chain blocks/lever hoist suspended with loads</p> <p>New “c)Crane operator to ensure that all safety devices are operational” f) New A dummy lift shall be conducted prior to lifting persons. g) New A meeting with all parties involved prior to lifting persons. h) New The crane operator must never leave the crane control station if he lifts people. i) New The required equipment necessary to perform</p>
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		<p>an emergency rescue shall be available throughout the lifting operation.</p> <p>j) New All operations should be proceeding gently with low speeds.</p> <p>28. Numbering changed from 2.10.6 to 2.22 General Safety Procedures when lifting</p> <p>2.22.1 added “(engineering design and approval)”</p> <p>2.22.11 added “(trained personnel according to SANS 10296 2009)”</p> <p>2.22.19 new Never weld on a suspended load.</p> <p>2.22.20 new When using eye bolts do not apply side loading.</p> <p>2.22.21 new Ensure that the correct lifting tackle is used for the task</p> <p>29. Numbering Changed from 2.10.7 to 2.23 Additional Precautions for Webbing Slings changed to Webbing Slings</p> <p>New “Note: The use of webbing and endless round slings to be avoided as far as possible”</p> <p>30. Numbering changed from 2.10.7 to 2.24 Incident Reporting</p> <p>2.24.1 added “crane coordinator and SHE Department shall be informed immediately”</p> <p>2.24.3 added “Section 24 and General Machinery Regulation 7”.</p> <p>31. Numbering changed from 2.10.9 to 2.25 Incident Investigations</p> <p>Added “competent and appointed incident investigator”</p> <p>32. Numbering changed from 2.10.2.26 Safe Access to Lifting Machines.</p> <p>33. Numbering changed from 2.10.11 to 2.27 Barricading of work area</p> <p>2.27.2 Added “but not under the suspended load.</p> <p>2.27.4 New The flagman must warn the people if they are passing over workers by means of a red flag or and whistle and to keep pedestrians out of barricaded area.</p> <p>34. Numbering changed from 2.11 to 2.28 Maintenance and Inspections</p> <p>numbering changed from 2.11.1 to 2.28.1 Lifting Machines</p> <p>g) New Maintenance procedures should be put in place according to manufacturer's specifications or work environment.</p>
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		<p>40.Numbering changed from 2.12.5 to 2.29.5 Textile or Webbing Slings</p> <p>41. Numbering has changed from 2.12.6 to 2.29.6 Steel Wire Slings</p> <p>42. Numbering changed from 2.12.7 to 2.29.7 2.29.7 Ferrules</p> <p>43 Numbering changed from 2.12.8 to 2.29.8 Additional care on Steel Wire Ropes and Fibre Slings</p> <p>44.Numbering changed from 2.12.9 to 2.29.9 Polyester Webbing Slings</p> <p>45. Numbering changed from 2.12.10 to 2.29.10 Quality Requirements</p> <p>46. Numbering changed from 2.12.11 to 2.29.11 Marking and Identification of Webbing Slings</p> <p>47. Numbering changed from 2.12.12 to 2.29.12 Traceability code.</p> <p>48. Numbering changed from 2.12.13 to 2.29.13 Chain and Chain Slings</p> <p>49. Numbering changed from 2.12.14 to 2.29.14 Sling Hooks</p> <p>50. Numbering changed from 2.13 to 2.30 Shackles</p> <p>51. Numbering changed from 2.13.1 to 2.30.1 Characteristics of Shackles</p> <p>52. Numbering changed from 2.13.2 to 2.30.2 Selection of Shackles</p> <p>53 Numbering changed from 2.14 to 2.31 Eyebolts</p> <p>54. Numbering changed from 2.14.1 to 2.31.1 Types of Eyebolts</p> <p>55. Numbering changed from 2.14.2 to 2.31.2 Marking; Shackles Eyebolts, Eyenuts and Swivels.</p> <p>56.Numbering changed from 2.14.3 to 2.31.3 Inspection of Lifting Tackle</p> <p>57. Numbering changed from 2.14.3.1 to 2.31.3.1 Frequent Pre-use Inspections.</p> <p>58. Numbering changed from 2.14.3.2 to 2.31.3.2 Inspection of Wire Slings</p> <p>59. Numbering changed from 2.14.3.3 to 2.31.3.3 Inspection of Polyester Webbing Slings</p>
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		<p>80. Numbering changed from 2.24 to 2.37 Weld-on Lifting Points</p> <p>81. Numbering changed from 2.25 to 2.38 Issue and Receipt of Lifting Equipment</p> <p>82. Numbering changed from 2.26 to 2.39 Maximum Lifting and Rigging Loads for Competent People 2.39.2 changed “10000kg to 5000kg” 2.39.3 added “(red seal)”</p> <p>83. 3.2.1. Normative added 3.2.1.2 32-166 Earthing Code of Practice for the Application of Earthing and Bonding Gear on High Voltage Systems 3.2.1.3 32-418 Working from heights 3.2.1.4 32-62 Psychometric assessment 3.2.1.5 32-136 Construction safety</p> <p>84. 3.2.2 Informative added SANS 4309:2003 (E) Crane Wire ropes Code of Practice for care Maintenance (including installation) examination and discard.</p> <p>BS EN 14502-1:201 Cranes –Equipment for the lifting of persons</p> <p>SANS 500:2009 Inspection, Examination and testing of manually operated chain blocks and lever hoists in use.</p> <p>SANS 687:2008 Inspection and testing of non-fixed lifting attachments.</p> <p>SANS 1594:2007 Manually operated chain blocks</p> <p>SANS 1599-1:2006 Cranes part1: Cantilever/Slewing jib cranes</p> <p>SANS 10307:2006 Cranes lifting and suspended equipment-Support Documentation and Training.</p> <p>SANS 10375:2005 The Inspection, Testing and Examination of overhead cranes</p> <p>85.3.3 Definitions added</p> <p>3.3.14 Critical Lifts are defined as:</p> <ul style="list-style-type: none"> Any lift that utilizes more than one crane or hoisting device. - Examples include two different cranes (tandem lift), a crane and a tele-handler (forklift), both the auxiliary and main boom of a single crane. Using a come-a-long (turf) to balance a load for lifting would not typically make the lift critical. Any lift weighing in excess of 20 tons – this would include the weight of a stored jib (if applicable) the block & hook, all rigging components, total weight
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		<p>of the load being lifted and the load line weight. 85% of Load Chart – lifts that include the total weight to be in excess of 85% of the load chart taking into consideration the current configuration of the crane. Note that an operator may lift a load at 75%, slew then boom down and be in excess of the 85% rule;</p> <p>Any Lift involving a crane suspended work platform (Man Cage) – Using a crane to lift a worker or workers to an elevated position by means of a personnel basket or man cage. The need to suspend personnel by using a basket or man cage lifted by a crane must be the last resort. A more feasible means of performing the work safely shall be considered first before lifting personnel to elevated areas with a crane.</p> <ul style="list-style-type: none"> Any lift over critical operating and/or process equipment – this would include lifting over electrically energised systems, tanks and operating processes. Multiple Lifting Devices – any lift in excess of 20 tons. Total weight includes load, hoist line weight below the tip of the boom, Weight of the Jib installed or stored, load block weight and all rigging equipment (shackles, slings, lifting beams, etc); Load Transfer Transferring / shifting the load vertically by means of a secondary lifting machine to place the load into position.
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6 Development team

The following people were involved in the development of this procedure

Arrie Botha

Johan Greyling

JJ van Zyl

Richard Ross Allen

Deon Havenga

Lennard Goosen

Frans Swanepoel

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Annexure A (Informative)

Personnel Carrier Pre-use Check

Inspector:	Date:	
Platform ID:		
Marking	Satisfactory	Unsatisfactory
Platform (all information legible)		
Make of platform		
Date of manufacture		
Safe working load		
Number of people licensed to carry		
Certificate issued by Department of Labour		
Last inspection/examination		
Suspension system		
Structure		
Load-supporting welds/bolts		
Load-supporting members		
Barrier from toe board to intermediate rail		
Hand rail		
Fall protection device		
Anchorage points		
Gate-locking mechanisms		
Platform flooring		
Suspension attachment points		
Attachment mechanisms		
Pins/eyes		
Wire rope/chain		
Master links and shackles		
Special-purpose items (e.g. overhead protection, platform controls)		
1		
2		
3		
4		
General comments:		
Weather conditions and lighting:		
Appointed person/crane supervisor:		
Name (print).....Signature.....Date.....		

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