

Cranes and Lifting Equipment

I PURPOSE

To establish standards for the safe operation of cranes or any other lifting or hoisting system.

2 SCOPE

This procedure applies to all operating areas, projects, exploration and all employees and contractors within the scope of the Integrated Management System (IMS).

3 DEFINITIONS AND ACRONYMS

Definitions

Cables are longitudinal steel elements consisting of a number of steel threads twisted in a special way.

Cable Slings are steel cables with loops at their ends, used to hoist loads. They are less flexible than slings.

Crane is a machine designed to lift loads based on the fundamental principle of the lever. It includes a counterweight, a support point, and the load to be hoisted.

Critical Lift is a lift requiring more than 80% of the crane's rated capacity and/or a lift carried out under non-routine conditions (lifting over energized power lines or over existing facilities etc.).

Beam Clamp is a manufactured clamp designed to be attached to a beam for lifting, pulling, tie off points, and/or other functions as engineered.

Hoist for Light Equipment is a hydraulic machine designed to lift light equipment for its maintenance.

Hoisting Equipment is equipment used to mechanically move loads between two points.

Man Lift is a machine that has a cage-type platform which is elevated to carry out works at different heights.

Material Hoist is a machine designed to elevate and transport a heavy load over some front lugs.

Operator the person qualified and certified by the training area to operate mobile cranes, bridge cranes and truck cranes.

Plate is an element used to distribute over ground, the force exerted by the hydraulic jacks at the time of hoisting a load.

Rigger is the trained and authorized person in charge of doing signals for maneuvers to the crane operator and verifying that safety conditions during the lift are appropriate. He will be exclusively devoted to this safety activity until the operation is over.

Safety Pin (clip, tongue) is an element that goes inside the hook and is used to prevent the shackle, sling or strap from moving out of the bend of the hook.

Shackle is a steel element where the loops of the straps or the body or loops of the slings are placed.

Slings are longitudinal elements usually made of synthetic material, with loops at their ends. Slings are wrapped around the load and are used to lift the load. Their main feature is their flexibility.

Strand is a length of twisted threads; the intertwining of strands makes up a cable.

Tag lines are ropes used to control/position the load without exposing employees to suspended loads.

Winch/Drum is the section of the crane that winds the cable used for hoisting operations, either rolling or unrolling the cable.

Acronyms

HMR	HSLP Management Representative
HSLP	Health, Safety and Loss Prevention
IMS	Integrated Management System
MSHA	Mine Safety and Health Administration

4 ROLES AND RESPONSIBILITIES

Document Owner

HMR

Responsible Roles and Position-Holders

Contractors/Vendors are businesses performing a service for the COMPANY. They are responsible for ensuring their employees working on COMPANY sites understand and comply with the requirements as outlined in this procedure.

Employees and Contracted Employees are all employees in any position whether COMPANY or contracted employees working on any COMPANY site. They are responsible for complying with the requirements as outlined in this procedure.

Visitors are anyone not employed by the COMPANY in any capacity but are traveling or touring on a COMPANY site. They are responsible for complying with the requirements as outlined in this procedure.

HSLP is any COMPANY employee working under and including the Regional Director of HSLP. They are responsible for periodically auditing for compliance to this procedure.

A Supervisor/Foreman or Designee can be a COMPANY employee or a contractor/vendor working or traveling on any COMPANY site. They ensure personnel in his/her responsibility are provided with needed and necessary training for this procedure and that only those trained and certified operate hoisting equipment.

General Foreman can be a COMPANY employee or a contractor/vendor working or traveling on any COMPANY site. They are responsible for ensuring compliance for general inspections of all cranes, lifting accessories, and man lifting equipment as scheduled and verified by supervisors every six months.

Manager can be a COMPANY employee or a contractor/vendor working or traveling on any COMPANY site. They are responsible for ensuring there is an inventory (list) of cranes and man lifting equipment and that inspections and certifications by specialists or competent personnel are carried out before the equipment is used at the mine.

5 DIRECTION

General Standards

Expert/competent personnel shall be used to conduct inspections on an annual basis. A record of these inspections must be kept on file with area of responsibility.

Tests for lifting capacity shall be carried out after each repair or significant change to the crane. These tests shall be documented and kept on file with area of responsibility.

An Equipment or Crane Pre-use Form shall be filled out daily.

Immediately report any substandard condition to supervisors.

Supervisors shall schedule and verify inspections of all cranes, lifting accessories, and man lifting equipment every six months and ensure equipment is made available for preventive maintenance as scheduled.

Crane operators shall be certified and updated on an annual basis.

Riggers shall be annually evaluated.

All cranes and man-lifts must have the loading table and the operation manual readily available.

Every hoisting operation must be planned by the supervisor or leader in charge in collaboration with the operator and rigger. Potential weather conditions such as wind shall be part of the plan.

No damaged or defective equipment must be operated.

The construction, operation and maintenance of equipment and accessories must comply with the technical standards established by the manufacturer.

Oversized cranes (those greater than 12 feet wide and/or higher than 20 feet) shall be transported using an escort vehicle. The vehicle shall travel at an appropriate distance in front of the crane, with warning lights flashing.

The standard international signaling system for movement of cranes will be used. Any signaling shall be carried out by the rigger.

Crane operators shall only obey the orders of one rigger, who shall wear clothes etc., which distinguish him from the rest of workers (red colored reflective vest with the word "Rigger" written at the top of the back). In case of emergency, the stop signal can be given by any person and must be obeyed immediately.

If any doubt exists about the interpretation of a signal it should be interpreted as a stop signal.

Tag lines should be used to guide suspended loads in a sufficient number according to volume and shape of the load. Tag lines shall be tied to the load before being suspended.

When slings with hooks tied around the load are used, make sure that the cable pulls into, not out of, the hook.

The work area must be visually inspected to detect potential hazards before moving the crane.

The load must be lifted gradually to avoid a sudden strong jerk of cable and slings.

Ensure that no people are in the area of influence of the crane before moving the load.

Never allow people to stand below a suspended load and never swing a load out over people.

Never leave the crane cab while the motor is running or a load is suspended.

Any crane job involving the movement of loads at heights must be indicated with signs on the ground and on its four sides. For this purpose, signs or barriers must be placed warning about the possibility of objects falling to the ground.

Every mobile crane must be fitted with an alarm device to warn people that it is moving or turning.

The operator must keep his hands on the control panel. In this way, the operator is able to quickly stop the crane in case of emergency.

Operators must not use the control limits to stop the lifting operation under normal operating conditions. These controls are exclusively intended to serve as a safety feature.

Safety devices, if any, must never be disconnected to exceed allowable limits.

A crane must never be operated if the safety switches are not working.

A crane must never be operated if the cable has been improperly rolled over the drum. There must be at least three cable turns over the drum or winch at all times.

A crane must never be loaded above its load capacity. Use the loading table. Operators must know the load weight and the crane limitations.

Passengers are not allowed in any place on the crane. Operators must not allow anybody to climb onto the hooks or loads.

If there are people nearby, the horn must be sounded to alert them.

Slings and cables must be carefully inspected before being used by the rigger. If they are defective, they must be cut and immediately removed to ensure nobody uses them again.

The rigger must make sure that no materials, tools, etc. have been left on top of the load to be lifted.

Loads must never be lifted if there is a loose hook, as it could hit the operator's cabin or become tangled with the crane's jib.

No crane or hoisting equipment must be operated if the hook has no safety pin.

Loads more than 12 feet long, such as pipes and similar loads, must be lifted with a two-legged sling for better balance.

Three equally distant points must be marked on every hook in order to measure any deformation that may result from its use, which must never exceed fifteen percent (15%) of the original size.

Loads must not rotate, move or seat violently because the load, boom, cables or the crane structure could be damaged. This can also cause violent releases of splinters which can harm the personnel involved in this activity.

Hooks must not be painted, welded, sharpened, heated or repaired, so that fissures can be detected.

If any unsafe condition is detected in the crane, stop work immediately, place a danger/warning tag on the crane controls and advise the supervisor.

If more than one crane is needed for joint maneuvering, then the work must be carefully planned with skilled personnel.

Before starting the lifting operation, the operator must make sure that the load is aligned vertically to avoid imbalance that could affect the equipment and the load.

Movement control buttons must be clearly marked, indicating the direction of crane movement.

Hoisting equipment must be fitted with safety limit switches, both for moving equipment and for maximum lifting level.

In electrically-driven lifting equipment, special care must be taken to make sure that cables do not become trapped by the lifting action. All necessary protective devices must be available, including grounding.

No hoisting activity shall be carried out during an electric storm or severe weather.

Safe distances to high-tension lines must be kept, as follows:

- a** For lines up to 125,000 volts: no part of a crane must get closer than 10 feet to cables, poles and accessories.
- b** For lines between 125,000 volts and 250,000 volts: the distance must be 16 feet.
- c** For lines over 250,000 to 500,000 volts: the appropriate distance is 25 feet.

Before moving a crane under high-tension lines, the route must have been previously inspected by the Supervisor to avoid coming into contact with any part of the crane, or triggering an electric induction process.

Do not use a crane to pull or move a load horizontally since this equipment is designed to lift loads.

Hoist for Light Vehicles

All welding cords of any hoist will be rigorously inspected every six months.

After lifting a light vehicle with the hoist, appropriate supports must be used to secure the vehicle once the lift is complete.

Lifting Gear

The safe capacity of lifting gear shall be determined and shall not be exceeded.

For items of rigging used in combination, the safe working load shall be that of the weakest item.

The use of job-fabricated lifting gear is prohibited on the work site. They must be factory-made.

The installation, maintenance, and repair of lifting accessories shall be performed only by the manufacturer or in accordance with the manufacturer's written instructions.

When chains are used for hoisting, only cast steel chains will be used.

Hooks, rings, links, or other attachments when used with steel chains shall have a rated capacity at least equal to that of the chain.

Whenever wear at any point in any chain link exceeds that shown in the following table, the chain shall be removed from service.

1/4 inch	3/64 inch	1 inch	7/32 inch
3/8 inch	5/64 inch	1-1/8 inch	7/32 inch
1/2 inch	7/64 inch	1-1/4 inch	1/4 inch
5/8 inch	9/64 inch	1-3/8 inch	9/32 inch
3/4 inch	5/32 inch	1-1/2 inch	5/16 inch

Only commercial wire rope fittings shall be used.

Protruding ends of strands in splices on wire rope slings and bridles shall be covered or blunted.

Except for end fasteners, wire rope used in hoisting, lowering, or pulling loads shall consist of one continuous run without knots or splices.

Eyes in wire rope shall not be formed by wire clips or knots.

Wire rope shall be correctly over-wound or under-wound from right to left or left to right in accordance with the lay to avoid twisting, spreading, or overlapping on winch drums.

The ratio between the rope diameter and the drum or sheave diameter shall not be less than specified by the equipment manufacturer.

Drums, sheaves, and pulleys shall be smooth and free from defects which could damage the rope.

Wire rope with one or more of the following defects shall be removed from hoisting or load carrying service immediately:

- a** Corrosion resulting from acids or alkalizes. Rust film which has not resulted in pitting or loss of more than one third of the original wire diameter should be removed and the rope lubricated.
- b** Broken Wire -One or more valley breaks. (A valley break is a wire break occurring in the valley between two adjacent strands.)
- c** Six randomly broken wires in one wire rope lay or three broken wires in one strand in any one lay.
- d** Abrasion, scrubbing, flattening, or peening resulting in loss of more than one third of the original diameter of the outside wires.
- e** Kinking, crushing, bird caging, or other damage resulting in distortion of the rope structure.
- f** Heat damage. Evidence of heat damage resulting from a torch, excessive friction, or contact with electrical wires.
- g** Diameter Reduction. Reduction from nominal diameter or more than 3/64 inch for rope diameters up to and including 3/4 inch, or more than 1/16 inch for diameter 7/8 to 1-1/8 inches, and of more than 3/32 inch for rope diameters 1-1/4 to 1-1/2 inches.

A steel wire rope shall not be used if it has a total of more than five (5) broken threads, or more than three (3) broken threads in one strand, or if the number of broken threads in a length of 6.5 ft. – where there are more broken threads – exceeds 10% of the total number of threads.

Wire rope removed from service due to defects shall be cut up and discarded.

Slings and wire rope shall be protected from rough, sharp or square corners by appropriate means to prevent damage.

Slings shall have the sling load rating identified on the sling.

Proper storage shall be provided for slings when not in use to ensure against damage.

Shackles used for hoisting shall be of forged alloy steel, and shall be of the locking or secured-pin type.

Shackles that are bent, distorted, or worn in the crown or pin by more than 10% of their original diameter shall be removed from service.

Hoisting hooks, shall be of forged alloy steel, and shall be stamped with their working loads.

Beam Clamps used for lifting shall be the appropriate size for the beam as well as designed and engineered for lifting.

When beam clamps are used for lifting, a minimum of 2 beam clamps will be used for each lift.

A lifting gear inspection should be conducted once every six months. After each inspection, the following color code indication will be included:

YEAR	COLOR
1ST Half Year	Blue
2ND Half Year	Yellow

Man lift

Before using man lift equipment, the man lift must be tested.

Data plates shall be placed on man lifts, containing maximum nominal capacity, weight, and manufacturer. If the data plate is lacking, or is illegible, the man lift shall not be used.

When platform personnel are performing welding activities, it shall be avoided that electrode holders are in contact with the platform components. The combined weight of personnel platform, tools or other equipment shall not exceed 50% of lifting capacity as specified in the crane load tables.

Personnel platform shall not be directly fastened to lattice boom mobile cranes.

Lifting men and load together is not allowed.

Lifting accessories on the crane are not allowed while man lifting is performed.

When work is being done near electric power lines, twice the distance specified for load lifting shall be kept.

Man lifting is not allowed using two cranes.

Personnel must comply as indicated in the: Working at Heights Procedure.

All welding cords of the lifting system of any man lift will be rigorously inspected every six months.

Material Hoist

The structure (lugs, forecastles and hydraulic system) of all material hoists will be formally inspected every six months.

It is strictly forbidden to climb onto the material hoist lugs or to stand under its projection.

Any load that does not have an appropriate base to be moved with the material hoist must be previously fastened.

The material hoist forecastle must not be used as a lifting or supporting system.

Mobile Cranes

Mobile cranes must not be used to lift people, unless approved baskets, fitted with a safety cable tied to the hook, are used.

Cranes used to lift people must be equipped with the following:

- a** A boom angle indicator with high and low reference points and audible and visual alarms. They must be visible from the operator's seat.
- b** A mechanism for the operator to determine the crane boom length from his/her position to operate for telescopic boom cranes.
- c** An anti-tube block lock device with audible/visual warning signals that activate and deactivate controls and functions of the crane when operating.
- d** A crane with the digital indicator of load lighting yellow or red must never be used since this could immediately create stress and violent fall of the boom along with the load.
- e** The boom elevator and load line shall have an electric device so that brakes can be automatically applied when control is on neutral.
- f** A device for the operator to know that the crane is leveled.
- g** A device for the operator to lock the rotating mechanism at any position of rotation.
- h** A radio or telephone communication system for voice communication between the crane operator and people on platform (internal channel).
- i** Free fall load line: If the crane is equipped with a free fall load line, all relevant measures shall be taken to ensure that it is completely disabled when the man lifting platform is being used.

Operators must wear safety belts at the time of operating the crane.

A spotter shall be utilized to help position the crane.

The crane must be kept at a safe distance from any obstacles, underground hazards, electrical hazards, depressions in the ground, ditches, big holes, and other dangerous areas.

A 12 foot clearance must be observed for any obstacles above the crane.

Hydraulic jack raising is not allowed. If this happens, maneuver shall be stopped.

Once hydraulic jacks are lifted, tires must not be in contact with ground. If so, crane capacity will be reduced to "on wheels".

Before lifting any load:

- a** Verify the capacity of the crane.
- b** Verify the weight of the load.
- c** Check the slings or straps to make sure that their size is correct and that they are in good condition.

- d** Check the ground for its capacity and stability to support the crane. If necessary, use solid wooden planks of 8 inch in thickness and 3 times the area of the jack plate.
- e** Level the crane, the maximum slope being 1%.
- f** All hydraulic jacks must be lowered to the ground before lifting a load.
- g** If necessary, simulate a lifting procedure to make sure you know how to lift the load.

The wind is an adverse element, for this reason an anemometer should be used. If the sustained wind speed is above 36 ft/sec. (25 mph) or gusts to 44 ft/sec (30 mph), hoisting operations shall be suspended. A wind speed of 26 ft/s (18mph) is generally considered safe for work, depending on the lift. Manufacturers guidelines need to be consulted to ensure cranes are not operated outside the design parameters.

Truck Crane

The crane must never be used in strong winds or storms. If wind speeds are above 67 ft/s (45 mph), crane movement is uncontrollable.

Always use chocks under tires and hydraulic jacks before lifting the load, as it will avoid movement of the vehicle if there is a sudden jerking of the load.

The operator must not lose sight of the load at any time; if he/she cannot see the load, then he/she will need a rigger to guide the operation.

The stabilizing brakes must never be used as hand brakes.

In the event that the crane is working on soft ground, place supporting plates under each jack, with an area of at least three times that of the jack plate. These supports will be made of wood in a single piece, at least two (2) inches thick.

The hydraulic jack must never be operated when the load is suspended.

When the crane is no longer used, the jib must always be left in a folded position. If this is not possible it must be mechanically fixed to the platform.

The vehicle must never be moved with a suspended load.

Once the accessories have been mounted, always check that they are in place. Accessories should never be adjusted while the crane is working.

The crane must never be installed on a vehicle that is not appropriate for such installation (pick-up trucks, dump trucks, etc.). This work can only be determined by the manufacture.