CRANES AND LIFTING EQUIPMENT

1.0 SCOPE

This standard applies to all cranes including vehicle-mounted cranes, equipment used as cranes, hoists, lifting and rigging equipment. The standard does not apply to hoisting operations in underground mines.

2.0 CRANES

2.1 Planning

The level of planning required for lifting is determined by the category of the lift.

<table>
<thead>
<tr>
<th>Category of Lift</th>
<th>Examples: (but not limited to)</th>
<th>Planning Required</th>
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</thead>
</table>
| High Risk/Abnormal Lifts      | - Liquid steel  
- All multiple crane lifts;  
- Lifts over operating areas that may endanger personnel  
- Lifts over power lines;  
- Lifts involving personnel cages;  
- Lifts over or exceeding maximum rated loads | - Risk Assessment  
- Develop a Lift Plan that addresses associated hazards  
- Incl. crane drivers and rigging crews in the lift plan development. A record of this involvement must be kept  
- See below for details on what should be included in the lift plan |
| Standard Lifts with SOP’s      | - Standard required lifts throughout the plant                                                   | - Risk Assessment  
- Develop a Standard Operating Procedure (SOP)                                        |
| Low Risk Lifts                | - Regular maintenance lifts                                                                    | - On the Job Risk Assessment  
- Follow safe operating practices                                                              |
2.2 **The lift plan must include:**

a) Lift data: equipment weight, rigging weight, total weight, height of lift, radius of lift and equipment surface area, centre of gravity.
b) Equipment data: manufacturer, model, size, boom length, jib length block, material size.
c) Rigging data: sling diameter, length, sling configuration, capacity, hook type, shackle size and capacity.
d) Proximity to power lines, pipe racks and process areas.
e) Local hazards and their controls and agreed communication methods.

2.3 **Operation**

a) There must be a documented process that ensures all critical components are inspected and in place prior to a crane being commissioned and put into service.
b) Crane operators must undertake a pre-operational safety check for each shift the crane is used and this should be kept with the crane. The detail required in the pre-operational safety check must be based on a risk assessment for the crane.
c) A crane must not be operated with an inoperable or defective safety device.
d) Overhead traveling cranes must be fitted with audible and visible travel alarms which must be used when loads are moved.

3.0 **MOBILE CRANES**

3.1 **Planning**

The level of planning required for lifting is determined by the category of the lift.

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<th>Examples: (but not limited to)</th>
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</tr>
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</table>
| High Risk/Abnormal Lifts| - Multiple mobile crane lifts;  
                        | - Mobile crane lifts in buildings with overhead cranes;  
                        | - Lifts over power lines;  
                        | - Lifts over or exceeding maximum rated loads | - Risk Assessment  
                        | - Develop a Lift Plan that addresses associated hazards  
                        | - Include crane drivers and rigging crews in the lift plan development.  
                        | - A record of this involvement must be kept  
                        | - See below for details on what should be included in the lift plan                             |
| Low Risk Lifts           | - Regular maintenance lifts                                                                 | - On the Job Risk Assessment  
                        |                                                                                           | - Follow safe operating practices |
3.2 The lift plan must include:

a) Lift data: equipment weight, rigging weight, total weight, height of lift, radius of lift and equipment surface area, centre of gravity.
b) Equipment data: manufacturer, model, size, boom length, jib length block, material size.
c) Rigging data: sling diameter, length, sling configuration, capacity, hook type, shackle size and capacity.
d) Lift computation: boom length, radius of lift, equipment capacity, size of outrigger footplates, and wind speed, including ground stability and slope.
e) Proximity to power lines, pipe racks and process areas: mobile cranes working in proximity to energised power lines must operate under a proximity permit, which must define exclusion zones and spotter duties.
f) Local hazards and their controls: including the route for the crane, ground stability, proximity of people or equipment and agreed communication method.
g) Where practicable cranes should be fitted with a load measurement device with the weight of the load displayed in the visual range of the operator.

3.3 Operation:

a) Mobile Crane operators must undertake a pre-operational safety check for each shift the crane is used and this should be kept with the crane.
b) Mobile cranes must have a rating capacity chart fixed in a position visible to the crane operator or available in the crane cabin.
c) Operator control stations for vehicle-mounted cranes must be located in an area protected from swinging loads and from the crane jib.
d) Slew pins must be secured in place in mobile cranes while traveling.
e) Operators must wear seat belts.
f) The use of outriggers is mandatory (down as minimum and extended as wide as possible), unless a risk assessment has determined otherwise.
g) Slewling to test the integrity of outriggers on mobile cranes must be conducted prior to commencing lifts.
h) Operator must not leave the crane controls with a load suspended.

4.0 Maintenance and Inspection

4.1 A record of cranes, hoists, rigging attachments and lifting slings (if required by local legislation) must be established.

4.2. Any mobile crane brought to site must have a current test certificate and a pre-use safety inspection to ensure the crane is fit for purpose. As a minimum, this inspection must satisfy regulatory and manufacturer requirements for frequency of inspection and physical condition of the machine.

4.3. There must be a system for the inspection, maintenance and approval of lifting equipment, including a process that verifies the equipment is able to function to its design specifications and the integrity of:
a) Mechanical and electrical components
b) Controls for critical pieces of lifting or rigging equipment
c) Crane cables and all lifting attachments
d) Structural components of the hoist, brakes, wheels, hooks, hook-blocks and rails
e) Load limiting devices, safety devices, limit switches and control systems required for individual equipment e.g. independent fail-safe braking systems, a device to stop the crane such as a “dead-persons” switch, and emergency shut-off switch.

4.4. Inspections and repairs to cranes, cables and lifting equipment must comply with the manufacturer’s specifications and regulatory requirements as a minimum.

4.5. Records of maintenance inspections and cable tests must be kept. Any defects must be highlighted by the inspection, and defective items rectified.

5.0 Training

5.1 Personnel must be trained, competent and authorized if they operate cranes; set-up or rig loads; provide signals for controlling lifts; or inspect, maintain or test cranes, hoists, personnel cages, lifting or rigging equipment. A record of training and authorization must be kept and there must be a method by which the competence of crane drivers is monitored and maintained.

5.2 There must be a system for establishing minimum operating time, frequency of operation and testing to ensure competency for each class of crane

5.3 There must be a formal procedure for communication and signaling between the operator and the signaler.

6.0 Practical matters

6.1 Assure that no slings, chains, hooks, ... as part of a set hanging from the same crane hook can move freely before starting any lift; free hanging chains etc must be avoided by attaching them to the crane hook or to the ring from which the slings or chains are hanging from the crane hook. This is an absolute necessity to avoid that these parts may swing freely and badly injure or kill people.

6.2. If a radio controlled crane is used, the crane operator is only allowed to move himself whilst making any crane movement, when (all conditions to be fulfilled at the same time):
- it is a standard transport
- he has an even walk way free of obstacles,
- he has a good view on the crane and the load
- he has a free view on the area where the load moves to
- he can perfectly see any movement of persons or vehicles as soon as they would come into the line of transport and he is be able to respond immediately and properly to such a situation
- a risk analysis has been done for the type of transport at hand to confirm this practice is acceptable.
(As a consequence, e.g. transport of liquid material and large weight loads would not pass the risk analysis investigation and would thus not allow movement of crane and operator at the same time.)

In all other cases (i.e. as soon as at least one of the above conditions is not fulfilled) and in the specific case when abnormal loads are lifted and transported with the crane, the load and the crane driver are not allowed to move a the same time i.e.
- the crane driver stands still and moves the load
- the crane driver only moves when the load is not making any movement.
That way, uncontrolled load movements due to stumbling or falling crane drivers are avoided.

6.3 Before any movements starts, assure the load is free to move!

After the sling is properly attached to the load, there are a number of good lifting techniques that are common to all slings:
- Make sure that the load is not lagged, clamped, or bolted to the floor.
- Be aware of clamped loads due to oxidation or scrap. First make the load free.
- Guard against shock loading by taking up the slack in the sling slowly. Apply power cautiously so as to prevent jerking at the beginning of the lift, and accelerate or decelerate slowly.
- Check the tension on the sling. Raise the load a few inches, stop, and check for proper balance and that all items are clear of the path of travel. Never allow anyone to ride on the hood or load.
- Keep all personnel clear while the load is being raised, moved, or lowered. Crane or hoist operators should watch the load at all times when it is in motion.
- Finally, obey the following "nevers" :
  - Never allow more than one person to control a lift or give signals to a crane or hoist operator except to warn of a hazardous situation.
  - Never raise the load more than necessary.
  - Never leave the load suspended in the air.
  - Never work under a suspended load or allow anyone else to. In practice this means that the minimum distance between any person and the load must at least be equal to the distance between the load and the floor on which the person is standing.

6.4 In order to determine the size and configuration of sling necessary to lift any given load, users should appreciate the difference between working load limits and safe working loads and how these important limits are arrived at.

**The Working Load Limit (WLL)**
The working load limit is the maximum load (mass) that an item of lifting equipment is designed to raise, lower or suspend. In some standards and documents, WLL is referred to as 'maximum safe working load'.

**The Safe Working Load (SWL)**
The safe working load is the maximum mass which may be raised, lowered or suspended under specific service conditions. The onus is on the user to obtain a competent person's assessment of a SWL in the light of that person's knowledge of the particular conditions of service. Under normal service conditions the SWL will be
the same as the WLL. If service conditions are liable to be hazardous, for example, extremes of temperature, possibility of severe shock loading, lifting loads across public roads or footpaths, or if the load is inherently dangerous such as acid or molten metal, lagged or clamped loads, the competent person must fix a SWL less than the WLL, the degree of de-rating depending upon the degree of potential hazard