



**TEREX | DEMAG**

**RISK ASSESSMENT  
DEMAG  
ALL TERRAIN CRANE**



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## 1.0 INTRODUCTION

Terex Cranes have carried out a hazard and risk assessment on this plant in accordance with the Australian Standards and Regulations provided.

These regulations specify specific duties for designers, manufacturers, importers, and suppliers in relation to risk management. The process involving hazard identification, risk assessment and the application of appropriate risk controls for plant.

As a supplier of plant to Australia, Terex Cranes is providing this information regarding hazard identification, risk assessment, and make appropriate recommendations where required on risk controls.

The information provided in this document is sourced from the manuals provided by the manufacturer, Terex Demag of Germany, and from the experience of technical personnel in Terex Cranes Australia.

The information provided in the service manuals by Terex Cranes provides the guidance for safe operation of the plant.

The plant is to be used in accordance with the designers, manufacturers specifications for which the plant has been designed.

## **2.0 APPLICATION**

This assessment has been conducted in accordance with the National Plant Standard and the relevant State and Associated Regulations.

This assessment has been carried out on the Terex Demag Mobile Crane Range and may only apply to this plant.

The assessment covers general hazards, operational hazards, assembly and disassembly hazards, lubrication and maintenance hazards and the risk controls associated with these.

<b>ASSESSMENT NUMBER:</b>	<b>2011</b>
<b>MODEL:</b>	<b>DEMAG All Terrain Crane</b>
<b>DATE:</b>	<b>04/02/2011</b>

### 3.0 GENERIC TERMINOLOGY

This section covers the terminology and signs used in the manual or on the plant.

#### Item A. Signs used on the Plant.



#### **CRUSHING / COLLISION (Z29 800)**

For the points listed below, please also refer to the more detailed description in the corresponding sections of the operating manual.

- During assembly of the main boom, fly jib and superlift mast.
- Hook block when rotating with superstructure.



#### **SNAGGING / DRAGGING (Z 29 801)**

For the points listed below, please also refer to the more detailed description in the corresponding sections of the operating instructions.

- Head sheaves and deflection rollers
- Hook blocks
- Winches



## Item A. Signs used on the Plant. – Continued

### **CRUSHING / SHEARING ( Z 29 802)**



For the points listed below, please also refer to the more detailed description in the corresponding sections of the operating manual.

- Outriggers
- Counterweights
- Additional Equipment
- Load (with uncontrolled movements)
- Slewing the crane operator's cab
- Assembling and dismantling the boom system
- Assembling and dismantling the superstructure

### **HAZARDS DUE TO SLIPPING, STUMBLING, FALLING (Z 29 803)**



Only the catwalks and ladders described may be used. These provide sufficient places to hold on to and the catwalks are designed to prevent slipping (eg/ sanding, checker plate etc.)

Item B. Warning signs used in the manual.



**DANGER!**

“Danger” is used if performing an operation, a mounting procedure etc. NOT according to the prescriptions given may cause death or injuries of human beings.



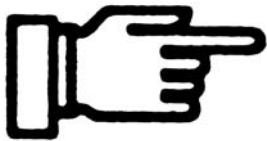
**CAUTION!**

“Caution” is used if performing an operation, a mounting procedure etc. NOT according to the prescriptions given may cause damages of the crane or parts of it.

**NOTE:**

“Note” is used for marking an important operation or mounting procedure as well as for additional information.

This operation manual includes two folding tables;



- The folding table at the beginning shows the operating devices in the crane cabin (chap. 4.1 “Cabin”).
- The folding table at the end shows the operating and monitoring devices in the dashboard (chap. 4.2 “Dashboard installation”).

When reading the operation manual these folding tables should be unfolded

Item C. Terminology used for assembly and disassembly.

**Terminology    Description**

<b>HA</b>	<b>Main Boom</b>
<b>HI</b>	<b>Fixed Fly Jib</b>
<b>MA</b>	<b>Mast</b>
<b>HDR</b>	<b>Heavy Duty Runner</b>
<b>H2</b>	<b>Hoist II</b>
<b>CW</b>	<b>Counterweight</b>
<b>W</b>	<b>Luffing Fly Jib</b>
<b>F</b>	<b>Fixed Fly Jib</b>
<b>SL</b>	<b>Supper Lift</b>



#### 4.0 CAUTION

**ALL PERSONNEL INVOLVED WITH THE OPERATION OF THIS PLANT, MUST READ AND THOROUGHLY UNDERSTAND THE MANUALS PROVIDED WITH THE PLANT.**

Only trained and authorised personnel are permitted to work on this plant.

Failure to fully understand and comprehend the operation of this plant could result in damage or injury.



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## 5.0 REFERENCES


1. Terex Cranes Operation Manual for AC 200 Mobile Crane
2. The National Standard for Plant and the following States and Territories proclaimed regulations relating to “Plant Safety”.
3. Victoria – Occupational Health & Safety (Plant) Regulations 1995.
4. Queensland – Workplace Health and Safety Act and Regulations 1995 and Code of Practice for Plant 1993.
5. Western Australia – Occupational Safety and Health Regulations 1995.
6. Northern Territories – Work Health (OHS) Regulations.
7. South Australia – Occupational Health, Safety and Welfare Regulations 1995.
8. Tasmania – Draft Workplace Health and Safety Regulations.
9. New South Wales – Occupational Health Safety Act 1983 – Draft Regulations based on National Standard for Plant.
10. Western Australia – Main Roads Department



## REFERENCES – Continued.

Reference	Description
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AS 1269	Acoustics: Hearing conservation.
AS 1319	Safety signs for the occupational environment.
AS 1418.1-5	Cranes: General requirements.
AS 1470	Health & Safety at Work: Principles & Practises.
AS 1674	Safety in Welding & allied Process.
AS 2550	Cranes: Safe Use.
AS 2550.1	Cranes: Safe Use – General Requirements.
AS 2626	Industrial Safety Belts & Harnesses: Selection, Use and Maintenance.
AS 4360	Risk Management
AS 4804	Occupational Health & Safety Management Systems – General Requirements.
DIN 15019.2	Compliance
AS/NZS 4501 1997	Occupational Protective Clothing
AS 3765.1 1990	Protection against General or Specific Chemicals
AS 1851.1 1995	Portable Fire Extinguishers & Fire Blankets


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## GENERAL HAZARDS

### Hazards Identified

### Risk Controls

1.	<b>Insufficient knowledge of the plant could lead to damage or serious injury.</b>	<p>→ Read and understand the Operating Manual of the plant prior to commencement of operation.</p> <p>→ Incorrect operation, servicing or inspection of the plant can lead to potential accidents or injury.</p> <p>→ Only a licensed person should operate the plant.</p> <p>→ Ensure boom / jib clearance from overhead obstructions.</p>
2.	<b>Wearing of unsuitable clothing, which may cause entanglement.</b>	<p>→ At all times the appropriate personal protective clothing must be worn when driving or operating the plant, or as in accordance with the site requirements or regulations.</p> <p>→ Wear a helmet, protective glasses, safety boots, gloves and other protective equipment required by site regulations.</p>


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GENERAL HAZARDS – Continued.

**Hazards Identified**

**Risk Controls**

3.	<p><b>Incorrect operation of controls could lead to damage or serious injury.</b></p>	<p>→ Follow all instructions and warnings noted in the Operation Manual, which you will also find clearly marked on areas of the plant. These contain instructions and warnings, which are necessary for the complete safe operation of the plant.</p> <p>→ Failure to observe the instructions could lead to possible incidents or injury.</p> <p>→ Incorrect operation of controls could seriously damage plant equipment.</p> <p>→ Do not attempt to operate the plant without fully understanding the operation manuals.</p> <p>→ If unclear of any instruction in the manuals, refer to the manufacturer.</p>
4.	<p><b>Damaged or defaced signage can lead to the non observance of warning signs</b></p>	<p>→ Ensure regular inspections and when damaged or defaced signs are identified they must be repaired / replaced immediately.</p> <p>→ Be fully conversant with all the warning and safety signs on the plant and in the operation manual.</p>


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**GENERAL HAZARDS – Continued.**

**Hazards Identified**

**Risk Controls**

5.	<b>Impact with other plant or personnel within the operational area could lead to collision or injury.</b>	<ul style="list-style-type: none"> <li>➔ A clear working zone must be defined by the use of barricades and safety tape and clear of any obstructions.</li> <li>➔ The operator must be aware and observe these areas at all times.</li> <li>➔ Only authorised personnel, equipment and plant are permitted within the working zone.</li> <li>➔ A designated person must direct any other equipment or personnel in the area.</li> <li>➔ If working in a public area, a traffic controller must be present.</li> <li>➔ No personnel other than the licensed operator are to be on the plant during operation.</li> </ul>
6.	<b>Impact with other plant or personnel due to poor visibility or adverse weather conditions</b>	<ul style="list-style-type: none"> <li>➔ Clear communication channels must be maintained between the dogman/rigger and the operator.</li> <li>➔ Any communication equipment failure should result in the immediate ceasing of operation until communication is re-established.</li> <li>➔ Where provided, audio/visual equipment must be operational.</li> <li>➔ Adequate lighting must be provided during times of poor visibility</li> <li>➔ During poor visibility use additional personnel to direct operations.</li> <li>➔ In very poor visibility, plant must be shut down.</li> </ul>


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GENERAL HAZARDS – Continued.

**Hazards Identified**

**Risk Controls**

7.	<b>Electrocution and fire from live overhead conductors.</b>	<ul style="list-style-type: none"> <li>→ <b>Extreme caution</b> is to be used when operating the plant near these devices.</li> <li>→ Consult the local electricity supply company responsible for the safe operating distances.</li> <li>→ If the regulated distance can not be achieved, power authorities must be notified and power disconnected.</li> <li>→ If operation is required in the proximity of live wire/cable, shielding must be in place.</li> <li>→ Ensure appropriate fire fighting equipment is available and know its location.</li> <li>→ A trained first aid officer must be available.</li> </ul>
8.	<b>Poor communication could result in damage or serious injury to personnel or plant.</b>	<ul style="list-style-type: none"> <li>→ Clear and concise directions are to be given by the designated dogman/rigger.</li> <li>→ Failure to do so could result in accident or injury to personnel or plant.</li> <li>→ Any communication equipment failure should result in the immediate ceasing of operation until communication is re-established.</li> <li>→ If communication fails, the licensed operator must be directed to stop operations.</li> <li>→ Operation of plant must not commence until full communications are restored.</li> </ul>

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**GENERAL HAZARDS – Continued.**

**Hazards Identified**

**Risk Controls**

9.	<b>Fire from oil, electrical, material and overheating.</b>	<p>→ Observe the location and availability of the fire equipment, and it's status and understand its instructions.</p> <p>→ All operators of the plant should be trained in the use of First Aid Fire Fighting Appliances provided.</p> <p>→ Ensure correct extinguishers are available.</p> <p>→ There should be a caution relating to the repair of load bearing members without prior approval of the manufacturer.</p>
10.	<b>Accident resulting in shock or injury.</b>	<p>→ Ensure there is an appropriate first aid kit on the plant, and that it is fully maintained at all times.</p> <p>→ Ensure that the appropriate emergency services are contacted.</p> <p>→ All operators should be trained in basic first aid.</p> <p>→ All personnel must be aware of emergency numbers.</p>




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GENERAL HAZARDS – Continued.

**Hazards Identified**

**Risk Controls**

11.	<b>Spillage's</b>	<p>→ Any spillage of fuels or lubricants must be handled in accordance with the appropriate regulations.</p> <p>→ Appropriate personal protective clothing is to be worn, such as helmet, protective glasses, safety boots, gloves and any other protective equipment required by site regulations.</p> <p>→ An approved spillage kit is to be readily available.</p>
12.	<b>Obstruction of access and egress could lead to injury.</b>	<p>→ All access and egress on and off the plant must be clearly marked and kept clear of obstructions at all times.</p> <p>→ Repair or replace any damaged walkways or ladders.</p> <p>→ Ensure all surfaces are free of contaminates eg/ all grease, water etc.</p>
13.	<b>Jumping from plant.</b>	<p>→ Use only ladders, handrails and walkways provided.</p> <p>→ DO NOT jump from plant at any time.</p> <p>→ DO NOT jump from plant when it is in motion.</p>


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GENERAL HAZARDS – Continued.

**Hazards Identified**

**Risk Controls**

14.	<p><b>Replacing fuel and Lubricants on plant.</b></p>	<ul style="list-style-type: none"> <li>➔The load must be lowered to the ground, the plant secured and the engine shut down.</li> <li>➔Activate the battery isolator where fitted and tag the plant with the appropriated signage.</li> <li>➔Observe the location and availability of the fire fighting equipment and it's status.</li> <li>➔Appropriate personal protective clothing is to be worn, such as helmet, protective glasses, safety boots, gloves and any other protective equipment required by site regulations.</li> <li>➔Re-fuelling and servicing must be carried out in accordance with the manufacturers instructions and guidelines.</li> <li>➔Excess fuel and lubrication must not be stored on the plant at any time.</li> <li>➔Any spillages must be cleaned up.</li> <li>➔Re-fuelling and lubrication points must be free of any contaminants.</li> </ul>
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GENERAL HAZARDS – Continued.

**Hazards Identified**

**Risk Controls**

15.	<b>Ill Health</b>	<p>→ At no time should any personnel operate, work or carry out maintenance on the plant whilst under the influence of alcohol, illicit drugs, or prescription drugs that may cause drowsiness.</p> <p>→ Do not attempt to operate this plant when you are excessively fatigued or feeling unwell.</p>
16.	<b>Exposure to excessive noise levels.</b>	<p>→ All noise protection equipment must remain in place on the plant.</p> <p>→ Earmuffs / earplugs must be worn if excessive noise levels have been measured.</p>


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**GENERAL HAZARDS – Continued.**

**Hazards Identified**

**Risk Controls**

17.	<p><b>Unplanned operation of the plant leading to damage of plant or serious injury to personnel.</b></p>	<ul style="list-style-type: none"> <li>➔ Do not attempt to operate the plant unless a full understanding of the plant and its operation has been carried out.</li> <li>➔ All plant systems must be operational prior to commencement of work</li> <li>➔ Check all limit switches, proximity switches.</li> <li>➔ Complete a visual inspection of the plant.</li> <li>➔ Refer to the Operation Manual for a complete listing of pre-operational checks and procedures.</li> <li>➔ Only trained and licensed personnel are to operate the plant.</li> </ul>
18.	<p><b>Miss-operation of the safe load indicator, leading to damage or injury.</b></p>	<ul style="list-style-type: none"> <li>➔ Only trained and licensed personnel are to program or operate the Safe Load Indicator.</li> <li>➔ Carry out pre-operational functions and check all plant safety systems.</li> <li>➔ Ensure correct program is accessed for the boom/jib/counterweight combination.</li> <li>➔ Refer to operation manual outlining the correct operation of the Safe Load Indicator.</li> <li>➔ If any function is unclear before commencing operation, contact the manufacturer.</li> <li>➔ DO NOT operate the plant if the Safe Load Indicator is not functioning.</li> </ul>


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## OPERATIONAL HAZARDS

### Hazards Identified

### Risk Controls

1.	<b>Collision, damage or injury due to unclear working zone.</b>	<ul style="list-style-type: none"> <li>➔ Physical and visual checks of the working zone and plant must be carried out prior to commencement of work.</li> <li>➔ Ensure barricades and safety tape is erected.</li> <li>➔ No unauthorised personnel are to be in the working zone.</li> <li>➔ No entry signs are to be placed.</li> <li>➔ A licensed dogman/rigger should be used to control the working zone.</li> </ul>
2.	<b>Accidental operation of the plant leading to collision, damage or injury.</b>	<ul style="list-style-type: none"> <li>➔ Before operation of the plant, if unsure of any procedure, refer to the Operation Manual as required or contact the supplier.</li> <li>➔ All plant systems must be operational and functional prior to commencement of work.</li> <li>➔ Refer to the Operation Manual for a complete listing of operational checks and procedures.</li> <li>➔ Strict observance of any warning tags attached to the plant must be adhered to.</li> <li>➔ Untrained personnel are not permitted to operate the plant.</li> </ul>


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OPERATIONAL HAZARDS – Continued.

**Hazards Identified**

**Risk Controls**

3.	<b>Excessive Wind</b>	<p>➔ If the wind exceeds the manufacturers specification, then the plant must not be operated. Also check with the local meteorological authority.</p> <p>➔ Refer to the Operation Manual for operational parameters in high wind.</p> <p>➔ In the event of working in a cyclonic high wind area, ensure that a procedure and safe work practice is followed and implemented to fully secure the plant.</p> <p>➔ Ensure the anemometer is fitted and operational.</p> <p>➔ Tag lines are to be used on load where possible.</p> <p>➔ In extreme circumstances a boom combination may have to be lowered to the ground.</p>
4.	<b>Poor ventilation resulting in carbon monoxide poisoning.</b>	<p>➔ Plant must be operated at all times in well ventilated areas, and following the instructions applicable to the operating site.</p>


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OPERATIONAL HAZARDS – Continued.

**Hazards Identified**

**Risk Controls**

5	<p><b>Slipping, tripping and falling from the plant.</b></p>	<ul style="list-style-type: none"> <li>➔ Remove additional rigging equipment used and ensure clear walkways are maintained.</li> <li>➔ At no time must personnel jump, or exit the plant other than the designated ladders and walkways.</li> <li>➔ Ensure all access points are free from contaminants such as oil, water, and grease.</li> <li>➔ Clear or remove all foreign objects such as rags, tools, cleaning equipment, drums, etc from the plant.</li> <li>➔ Check that all handrails and guards are correctly installed.</li> <li>➔ A fully body harness and inertia reel lanyard to be used where practicable when rigging or repairs are carried out on the crane.</li> </ul>
6.	<p><b>Boom deflections, which increase the radius and can lead to overload or tipping resulting in damage or injury.</b></p>	<ul style="list-style-type: none"> <li>➔ A licensed dogman/rigger must be responsible for the direction and operation of the plant.</li> <li>➔ A licensed operator must understand the configuration and load chart of the plant.</li> </ul>

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**OPERATIONAL HAZARDS – Continued.**

**Hazards Identified**

**Risk Controls**

7.	<b>Fatigue or injury resulting from poor ergonomics.</b>	<ul style="list-style-type: none"> <li>➔ Ensure seating is adjusted to enable comfortable operation of all controls. Refer to the operation manual for further clarification.</li> <li>➔ Clear visibility and adjustment of all visual aids, cameras and mirrors must be maintained at all times.</li> <li>➔ Maintain a clean working environment in and around operator’s cabin, ladders and walkways.</li> </ul>
8.	<b>Collision or damage resulting from a swinging load.</b>	<ul style="list-style-type: none"> <li>➔ Smooth operation of the plant is essential to avoid dynamic loading and centrifugal force, resulting in possible overloading, collision or damage.</li> <li>➔ Sudden or violent movement of the controls is to be avoided, as dynamic loading greatly reduces the safety margins of the plant.</li> <li>➔ Tag lines must be in place on load where possible.</li> </ul>




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OPERATIONAL HAZARDS – Continued.

**Hazards Identified**

**Risk Controls**

9.	<p><b>Injury or damage resulting from exceeding the safe working parameters.</b></p>	<ul style="list-style-type: none"> <li>➔ Do not operate the plant outside of its rated lifting capacity for its configuration.</li> <li>➔ Take care at all times to work within the recommended lifting charts.</li> <li>➔ Ensure the correct falls of line are reeved for the load being handled.</li> <li>➔ It is prohibited to use a plant to pull loads at an angle or to drag loads.</li> <li>➔ The plant should not be operated if the anti two block system is not functioning, Failure of this device would result in damage to the sheaves and rope.</li> <li>➔ Confirm that hook block and rigging equipment is included in the weight to be lifted.</li> <li>➔ Certification of the load to be lifted.</li> <li>➔ Ensure the plant is level before commencing operations.</li> <li>➔ Smooth operation of the plant is essential.</li> </ul>
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**OPERATIONAL HAZARDS – Continued.**

**Hazards Identified**

**Risk Controls**

10.	<b>Disablement of safety devices or excessive load on the configuration being used could result in injury, tipping or rolling.</b>	<ul style="list-style-type: none"> <li>➔ Under no circumstances should over-riding of the safety devices be undertaken</li> <li>➔ Refer to the Operation Manual for assembly / disassembly programs.</li> <li>➔ Ensure the correct counterweight is fitted for the boom/jib combination being used.</li> <li>➔ Do not park the plant on an embankment and maintain a safe distance from open trenches.</li> <li>➔ Disablement of the safety device could result in over loading resulting in structural damage and tipping.</li> <li>➔ Do not attempt to lift any load above the rated capacity for the combination being used.</li> </ul>
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**OPERATIONAL HAZARDS – Continued.**

**Hazards Identified**


**Risk Controls**

11.	<p><b>Damage or injury resulting from dropping the load, unstable load or overloading the plant.</b></p>	<ul style="list-style-type: none"> <li>➔No personnel should be under the load at any time, or in an area between a load and an obstruction.</li> <li>➔Ensure all safety devices are operational and functional eg/ anti two block, boom angle indicator.</li> <li>➔The Safe Load Indicator is an aid only. The load charts take precedence and the operator should fully understand all load charts.</li> <li>➔Loads should be kept close to the ground where possible.</li> <li>➔Ensure the safety catch on the hook is in working order.</li> <li>➔If the above risk occurs the operator should carry out full operational and functional check of the crane.</li> </ul>
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**OPERATIONAL HAZARDS – Continued.**

<b>Hazards Identified</b>	<b>Risk Controls</b>
<p>12. <b>Collisions and crushing with people under the load whilst winching or slewing.</b></p>	<ul style="list-style-type: none"> <li>➔ No personnel are permitted within the slewing range of the plant or under the path of the load.</li> <li>➔ The licensed operator should be aware of boom deflection when winching and no personnel should stand between a load and obstruction.</li> <li>➔ Work should be stopped if unauthorised persons refuse to leave the working zones.</li> <li>➔ Avoid sudden starting and stopping of loads as violent movement reduces the stability of the plant.</li> </ul>
<p>13. <b>Unintentional damage or injury from overloads.</b></p>	<ul style="list-style-type: none"> <li>➔ If this situation occurs the operator must immediately take action to bring the plant back into a safe operating condition.</li> <li>➔ If there is any damage to load bearing members, other plant or equipment or injury due to overloading, there may be a requirement for the incident to be reported to the Regulatory Authority in the State of operation. In these cases the operator (after making the plant safe) should shut the plant down until the accident has been reported and the regulator given the opportunity to investigate the incident.</li> </ul>


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**OPERATIONAL HAZARDS – Continued.**

**Hazards Identified**

**Risk Controls**

14.	<b>Damage or entanglement of rope during operations.</b>	<p>➔ Avoid at all times the situation of slack rope.</p> <p>➔ Disentanglement in some cases can be achieved by unwinding the rope and rewinding.</p> <p>➔ If entanglement occurs, shut down the plant and have a competent person carry out immediate inspection of drums and rope.</p> <p>➔ Avoid contact with other objects when hoisting or slewing.</p>
15.	<b>Hazards to air traffic due to boom / jib combinations.</b>	<p>➔ Operation of the plant can be carried out at heights, which may create hazards to air traffic.</p> <p>➔ Ensure that all relevant authorities are notified, such as the Federal Airport Corporation and the Police.</p> <p>➔ Aircraft warning lights must be fitted and operational where required by regulations.</p>


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OPERATIONAL HAZARDS – Continued.

**Hazards Identified**


**Risk Controls**

16.	<p><b>Collisions or damage due to more than one plant operating in unison.</b></p>	<ul style="list-style-type: none"> <li>➔ If the operating ranges of different plants overlap, a safe working procedure must be in place.</li> <li>➔ The supervisor, licensed operator and licensed dogman/rigger must have a safe operating procedure in place and communicated to others if using more than one crane.</li> <li>➔ Ensure that the crane operator can communicate with others clearly, by visual, audio aids and signals, and as per site conditions, regulations or standards.</li> <li>➔ Failure to adhere to the safe operating procedure could result in tipping or damage to the plant.</li> <li>➔ During tailing operations a clear safe working procedure is to be established before commencing operation.</li> </ul>
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**OPERATIONAL HAZARDS – Continued.**

Hazards Identified	Risk Controls
17. <b>Power failure of plant could result in damage or injury.</b>	<ul style="list-style-type: none"> <li>➔ In case of power failure all functions and movements of the plant are stopped completely.</li> <li>➔ Secure a safe working position around the plant and load area.</li> <li>➔ All operational mechanisms are locked hydraulically and mechanically, preventing any movement of the crane.</li> <li>➔ As the case described is extremely rare, contact the supplier immediately.</li> </ul>
18. <b>Shock or injury from high power electromagnetic transmitters.</b>	<ul style="list-style-type: none"> <li>➔ When operating in the vicinity of high power transmitters or radar stations, contact the relevant authority before commencement of work.</li> </ul>
19. <b>Electrocution from lightning strikes.</b>	<ul style="list-style-type: none"> <li>➔ Timber mats or earth straps are to be used when the boom / jib is erected.</li> </ul>
20. <b>Danger of crushing or collision when travelling.</b>	<ul style="list-style-type: none"> <li>➔ Tiger striping is in place on the counterweight of the crane.</li> <li>➔ Audible alarms have been fitted to indicate when the plant is propelled.</li> </ul>
21. <b>Tipping or sinking of the plant during operation</b>	<ul style="list-style-type: none"> <li>➔ Correct ground preparation by use of ballast bog mats to accommodate the ground pressure generated during lifting or travelling.</li> </ul>
22. <b>Falling from height.</b>	<ul style="list-style-type: none"> <li>➔ Access to the boom / jib when erected can be by an elevated work platform, scissor lift or approved man box.</li> <li>➔ Approval from the local authorities must be obtained prior to usage of a man box.</li> </ul>

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**OPERATIONAL HAZARDS – Continued.**

**Hazards Identified**

**Risk Controls**

23.	<b>Unintentional movement of the plant.</b>	➔ A licensed operator must remain in the cabin whilst there is a load on the hook.
24.	<b>Damage to public utilities</b>	➔ Obtain permits from relevant bodies ie/ local council, phone, gas, water, electric etc. prior to commencing work.
25.	<b>Damage or injury resulting from incorrect programming of IC1 system</b>	➔ Only licensed and trained personnel should carry out any adjustments or modifications to this system.
26.	<b>Damage or serious injury resulting in over riding of the deadman switch</b>	➔ As this is a main safety feature, at no time should this control be over ridden.




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## DRIVING THE CRANE

### Hazards Identified

### Risk Controls

1.	<b>Damage or injury to personnel, plant or other equipment.</b>	<ul style="list-style-type: none"> <li>➔ Only licensed and trained personnel are to drive the crane.</li> <li>➔ Before driving the plant, ensure all components and accessories are stowed and locked in place.</li> <li>➔ Check all wheel nuts for correct tension.</li> <li>➔ Ensure all tyres are correctly inflated and in good condition.</li> <li>➔ Function test all lights and accessories.</li> <li>➔ Confirm appropriate signage is in place and visible.</li> <li>➔ Check all fluid levels on the plant.</li> </ul>
2.	<b>Damage to plant and drive train</b>	<ul style="list-style-type: none"> <li>➔ Before driving crane, the suspension system must be levelled as per the Operation Instructions.</li> <li>➔ Whilst driving, monitor all warning systems and gauges. Eg: air pressure, suspension system, steering.</li> </ul>
3.	<b>Collision or damage with other objects.</b>	<ul style="list-style-type: none"> <li>➔ Ensure permits are current and observe all load regulations.</li> <li>➔ Continuously monitor clearance of the crane whilst driving.</li> </ul>


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## ASSEMBLY AND DISASSEMBLY

### Hazards Identified

### Risk Controls

1.	<p><b><u>Superstructure Boom:</u></b></p> <p><b>Crushing, falling, slipping and tripping on or from the superstructure.</b></p>	<ul style="list-style-type: none"> <li>➔ Only trained and licensed personnel should be involved in the assembly / disassembly of the superstructure boom.</li> <li>➔ Establish a clear working zone and obstruction free area using barricades and safety tape.</li> <li>➔ Keep clear and away from all matching surfaces.</li> <li>➔ All matching surfaces must be free of contaminates.</li> <li>➔ Check all locating pins and pinholes to ensure that they are free of contaminates.</li> <li>➔ Lift only from designated lifting points provided.</li> <li>➔ Ensure suitable ground conditions are provided for the assembly/disassembly.</li> <li>➔ Correct positioning and blocking and ground bearing pressure of the outriggers must be observed.</li> <li>➔ Only use designated access and egress points.</li> </ul>
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**ASSEMBLY AND DISASSEMBLY – Continued.**

**Hazards Identified**

**Risk Controls**

<p><b><u>Superstructure Boom:- Continued.</u></b></p> <p><b>Crushing, falling, slipping and tripping on or from the superstructure.</b></p>	<ul style="list-style-type: none"> <li>➔ When connecting/disconnecting hydraulic quick couplers, the engine must be shut down, and the hydraulic system de-pressurised.</li> <li>➔ Ensure quick couplers are contaminate free.</li> <li>➔ Ensure hydraulic hoses are matched.</li> <li>➔ Align and match all other connections.</li> <li>➔ When outrigger jacking, only authorised personnel involved should be present.</li> </ul>
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ASSEMBLY AND DISASSEMBLY – Continued.

**Hazards Identified**

**Risk Controls**

2.	<p><b><u>Winch, Hoist I, Hoist II:</u></b>  <b>Entanglement, crushing, slipping and injury.</b></p>	<ul style="list-style-type: none"> <li>➔ Ensure that the wire rope is secured and avoid slack rope.</li> <li>➔ Ensure all access and egress points are free of contaminates such as oil, grease, water etc.</li> <li>➔ When connecting/disconnecting hydraulic quick couplers the engine must be shut down, and hydraulic system de-pressurised.</li> <li>➔ Remove dust caps before assembly and re-fit after disassembly.</li> <li>➔ Ensure quick couplers are contaminate free.</li> <li>➔ Ensure hydraulic hoses are matched.</li> <li>➔ Align and match all other connections.</li> <li>➔ Only lift winches from the designated lifting points.</li> <li>➔ As required, personal protection equipment is to be worn, such as helmet, protective glasses, safety boots, gloves and any other protective equipment required by site regulations.</li> </ul>
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**ASSEMBLY AND DISASSEMBLY – Continued.**

**Hazards Identified**

**Risk Controls**

<p>3.</p>	<p><b><u>Counterweight mounted to the superstructure:</u></b>  <b>Collision, crushing and falling.</b></p>	<ul style="list-style-type: none"> <li>➔ Only trained and licensed personnel should be involved in the assembly/disassembly of the superstructure counterweight.</li> <li>➔ Establish a clear obstruction free working zone using barricades and safety tape..</li> <li>➔ Lift counterweight only from designated lifting points provided.</li> <li>➔ A licensed dogman/rigger must be in a position to observe the mounting of the counterweight with clear communication to the plant operators.</li> <li>➔ Ensure suitable personal safety equipment is worn when carrying out this operation using a full safety harness and inertia reel where practicable, with helmet, protective glasses, safety boots and gloves as required.</li> </ul>
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**ASSEMBLY AND DISASSEMBLY – Continued.**

**Hazards Identified**

**Risk Controls**

4.	<p><b><u>Main boom extension and runner:</u></b>  <b>Crushing, falling, slipping, tripping and collision.</b></p>	<ul style="list-style-type: none"> <li>→ Establish a clear obstruction free working zone using barricades and safety tape..</li> <li>→ Sections are only to be lifted from the approved lifting points and handled with soft slings.</li> <li>→ Check tools used for safe usage when carrying out assembly / disassembly.</li> <li>→ Failure to observe correct assembly procedures could lead to serious damage or injury.</li> <li>→ Ensure suitable personal safety equipment is worn when carrying out this operation such as helmet, protective glasses, safety boots, gloves and any other protective equipment required by site regulations.</li> <li>→ Consult the operation manual for the exact procedures for assembly and erection.</li> <li>→ All connecting pins for the mounting of the main boom extension, and runner must be driven from the outside in during assembly.</li> <li>→ Observe the site and government regulations when carrying out this procedure.</li> <li>→ Use approved safety harness and inertia reel lanyard where practicable tying off to boom section.</li> </ul>
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ASSEMBLY AND DISASSEMBLY – Continued.

**Hazards Identified**

**Risk Controls**

<p><b><u>Main boom extension and runner: - Continued.</u></b>  <b>Crushing, falling, slipping, tripping and collision.</b></p>	<p>→ Clear communication channels must be maintained between the licensed dogman/rigger and the operator. In the event of the communication equipment failure, all operations should cease immediately until communication can be re-established</p> <p>→ Only trained and licensed personnel should be involved in the assembly / disassembly of the main boom extension and runner.</p>
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ASSEMBLY AND DISASSEMBLY – Continued.

**Hazards Identified**

**Risk Controls**

5.	<p><b><u>Main Boom:</u></b>  <b>Tipping, collision resulting in damage or injury.</b></p>	<p>→ Only trained and licensed personnel should be involved in the assembly / disassembly of the main boom.</p> <p>→ A clear understanding of the procedures as per the operation manual.</p> <p>→ Check for any other obstructions when telescoping the boom.</p> <p>→ Ensure the correct code is entered for the configuration of the crane.</p>
6.	<p><b><u>Main Boom Extension:</u></b> -  <b>crushing and collision resulting in damage to the plant or injury to personnel.</b></p>	<p>→ Only trained and licensed personnel should be involved in the assembly / disassembly of the main boom.</p> <p>→ Establish a clear obstruction free working zone using barricades and safety tape..</p> <p>→ Ensure all hydraulic hoses are free of contaminates.</p> <p>→ Ensure all electrical connections are matched and safety systems checked and operational.</p>




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**ASSEMBLY AND DISASSEMBLY – Continued.**

**Hazards Identified**

**Risk Controls**


7.	<p><b><u>Reeving of Ropes:</u></b>  <b>Crushing, falling, slipping, snagging, tripping and entanglement.</b></p>	<ul style="list-style-type: none"> <li>➔ Only trained and licensed personnel should be involved in the reeving of the ropes.</li> <li>➔ Establish a clear obstruction free working zone using barricades and safety tape..</li> <li>➔ Clear communication channels must be maintained between the licensed dogman/rigger and the licensed operator. In the event of the communication equipment failure, all operations should cease immediately until communication can be re-established</li> <li>➔ The licensed dogman/rigger must have adequate safety protection against falling with suitable equipment and safety harnesses.</li> <li>➔ Consult the Operation Manual for complete procedure on reeving of ropes.</li> <li>➔ Keep hands, arms and loose clothing well clear of sheaves to avoid the risk of entanglement and crushing when reeving.</li> <li>➔ Maintain tension on all ropes when reeving to avoid the possibility of entanglement or slack ropes.</li> <li>➔ Observe all warning signs.</li> <li>➔ Use only manufacturers recommended hook blocks at all times.</li> <li>➔ The reeving procedure must be followed at all times as per the manual.</li> </ul>
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ASSEMBLY AND DISASSEMBLY – Continued.

	Hazards Identified	Risk Controls
8.	<p><b><u>Warning and control devices:</u></b>  <b>Damage or injury to plant or personnel.</b></p>	<p>→ All warning and control cables and connectors must be checked before operation and function.</p> <p>→ Any damaged items must be repaired or replaced prior to commencing operation.</p>
9.	<p><b><u>Changing Tyres:</u></b>  <b>Crushing or injury.</b></p>	<p>→ It is recommended that mechanical aids be used during this procedure.</p> <p>→ Establish a clear obstruction free working zone using barricades and safety tape..</p> <p>→ Establish clear communications with all parties when carrying out this procedure.</p> <p>→ Ensure correct tyre inflation as per manufacturers specifications.</p>


ASSEMBLY AND DISASSEMBLY – Continued.

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**Hazards Identified**

**Risk Controls**

10.	<b>Injury from high-pressure hydraulic oil</b>	<ul style="list-style-type: none"> <li>➔ Only trained and licensed personnel must undertake repairs and maintenance on the hydraulic system of the plant.</li> <li>➔ Before commencement, the hydraulic system must be cooled.</li> <li>➔ Before commencement of work the engine must be shut down and hydraulic system de-pressurised.</li> <li>➔ Any spills must be cleaned prior to commencement of work.</li> <li>➔ Ensure suitable personal protective equipment is worn when carrying out this operation such as helmet, protective glasses, safety boots, gloves and any other protective equipment required by site regulations.</li> </ul>
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## LUBRICATION AND MAINTENANCE

### Hazards Identified

### Risk Controls

	Hazards Identified	Risk Controls
1.	<b>Injury to operational and maintenance personnel.</b>	<ul style="list-style-type: none"> <li>➔ Inform the area supervisor and operating personnel of intended maintenance / repair.</li> <li>➔ When required place appropriate lockout tags and safety warning signs.</li> <li>➔ Ensure suitable personal protection equipment is worn when carrying out this operation such as helmet, protective glasses, safety boots, gloves and any other protective equipment required by site regulations.</li> <li>➔ Use only designated access and egress points ladders and walkways.</li> <li>➔ Only licensed personnel are to carry out maintenance.</li> <li>➔ Use only recommended oils and fluids as per the operation manual.</li> </ul>
2.	<b>Burning and scalding.</b>	<ul style="list-style-type: none"> <li>➔ Wait for all oils and lubricants to cool sufficiently prior to commencing maintenance or repairs.</li> </ul>


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**LUBRICATION AND MAINTENANCE – Continued.**

**Hazards Identified**


**Risk Controls**

	<b>Hazards Identified</b>	<b>Risk Controls</b>
3.	<b>Fire.</b>	<ul style="list-style-type: none"> <li>➔ Ensure the close proximity of the appropriate fire fighting equipment when carrying out any work on the plant.</li> <li>➔ Keep the plant clean of any combustible material.</li> <li>➔ Remove all residual traces of oil, fuel, cleaning agents and components and dispose of appropriately.</li> </ul>
4.	<b>Burning from battery fluids.</b>	<ul style="list-style-type: none"> <li>➔ Appropriate safety protection equipment such as long sleeve shirt, gloves and protective glasses must be used when handling the battery's, as battery fluid is diluted sulfuric acid.</li> </ul>

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**LUBRICATION AND MAINTENANCE – Continued.**

	<b>Hazards Identified</b>	<b>Risk Controls</b>
5.	<b>Fire, fumes and burns from welding.</b>	<ul style="list-style-type: none"> <li>➔ Obtain the appropriate permits prior to carrying out welding procedures.</li> <li>➔ Ensure the close proximity of the appropriate fire fighting equipment.</li> <li>➔ Do not weld or use naked flame near electrical lines or hydraulic hoses.</li> <li>➔ Protect the plant using fire blankets where required.</li> <li>➔ Keep the plant clean of any combustible material.</li> <li>➔ Before carrying out any welding remove the battery leads.</li> <li>➔ Ensure a clean weld area by the removal of paint and contaminates.</li> <li>➔ Attach the welding earth connection as close as possible to the work area.</li> <li>➔ Ensure sufficient ventilation in the work area.</li> <li>➔ Any repairs or modifications must be approved and clarified by the supplier.</li> <li>➔ Ensure appropriate screens are in place prior to commencement or welding.</li> <li>➔ Appropriate protection equipment must be used when using these processes.</li> </ul>


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**LUBRICATION AND MAINTENANCE – Continued.**

**Hazards Identified**

**Risk Controls**


6.	<b>Fire and explosion from using oxy acetylene process.</b>	<ul style="list-style-type: none"> <li>➔ Obtain the appropriate permits prior to operating a naked flame.</li> <li>➔ Ensure the close proximity of the appropriate fire fighting equipment.</li> <li>➔ Do not weld or use naked flame near electrical lines or hydraulic hoses.</li> <li>➔ Protect the plant using fire blankets where required.</li> <li>➔ Keep the plant clean of any combustible material.</li> <li>➔ Ensure a clean area by the removal of paint and contaminates, prior to using this process.</li> <li>➔ Ensure sufficient ventilation in the work area.</li> <li>➔ Any repairs or modifications must be approved and clarified by the supplier.</li> <li>➔ Appropriate protection equipment must be used when carrying out these processes such as helmet, gloves, safety glasses, boots and any other protective equipment required by site regulations.</li> </ul>
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**LUBRICATION AND MAINTENANCE – Continued.**

	<b>Hazards Identified</b>	<b>Risk Controls</b>
7.	<b>Vapour and explosion generated by the batteries.</b>	<p>→ If welding, or a naked flame is to be used in the vicinity of the battery's, the battery's must be removed prior to the commencement of work.</p> <p>→ Appropriate safety protection equipment must be used such as long sleeve shirt, gloves, protective glasses when handling the battery's, as battery fluid is diluted sulfuric acid.</p>
8.	<b>Injury from high-pressure hydraulic oil.</b>	<p>→ Only trained and licensed personnel must undertake repairs and maintenance on the hydraulic system of the plant.</p> <p>→ Before commencement, the hydraulic system must be cooled.</p> <p>→ Before commencement of work the engine must be shut down and hydraulic system de-pressurised.</p> <p>→ Any spills must be cleaned prior to commencement of work.</p> <p>→ Ensure suitable personal protective equipment is worn when carrying out this operation such as helmet, protective glasses, safety boots, gloves and any other protective equipment required by site regulations.</p>




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**LUBRICATION AND MAINTENANCE – Continued.**

**Hazards Identified**

**Risk Controls**

9.	<b>Environmental damage from spillage or leakage.</b>	<p>→ Use only approved containers to collect all contaminates.</p> <p>→ During maintenance a suitable absorbent agent must be on hand.</p> <p>→ In the unlikely event of a major spill the Environmental Protection Authority and local authorities must be contacted.</p> <p>→ Site safety conditions must be adhered to.</p> <p>→ Approved containers must be used to collect oils during routine service.</p>
10.	<b>Electrical malfunctioning resulting in damage or injury.</b>	<p>→ Only licensed and trained personnel should carry out any adjustments or modifications to the electrical system.</p>

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## PREVENTATIVE MAINTENANCE AND ROUTINE INSPECTIONS

### Hazards Identified

### Risk Controls

	Hazards Identified	Risk Controls
1.	<b>Damage or injury from failure to carry out routine inspections as per the lubrication and maintenance manual.</b>	<p>➔ Refer to the lubrication and maintenance schedule for items such as ropes, hook blocks, sheaves, bars, rods, main cords and lacings for inspection intervals.</p> <p>➔ Failure to observe the instructions of the maintenance schedule could lead to damage or injury.</p>
2.	<b>Damage or injury from corrosion or cracking.</b>	<p>➔ If corrosion or cracking on the plant is detected refer to the supplier for repair procedures.</p>
3.	<b>Injury due to poor visibility during maintenance.</b>	<p>➔ The work area should be adequately illuminated when carrying out maintenance / repairs.</p>