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Title: HAZARD ANALYSIS AND RISK ASSESSMENT	Document ID 092.D05
	Revision: A
Client: MONITOR INDUSTRIES	Date: 22/01/2020
Project: DESIGN VERIFICATION OF WINLET 575	Page: 1 of 21

PLANT DETAILS

PLANT TYPE	GLASS-LIFTING ROBOT
MANUFACTURER	GMV A/S
MODEL	WINLET 575
PROJECT	DESIGN VERIFICATION OF WINLET 575
CLIENT	MONITOR INDUSTRIES
INSPECTOR	EDENILSON JAIMES
INSPECTION DATE	06/06/2019
INSPECTION LOCATION	MONITOR INDUSTRIES, TAMWORTH
DOCUMENT TITLE	HAZARD ANALYSIS AND RISK ASSESSMENT
DOCUMENT ID	092.D05
DOCUMENT REVISION	A
DOCUMENT DATE	22/01/2020

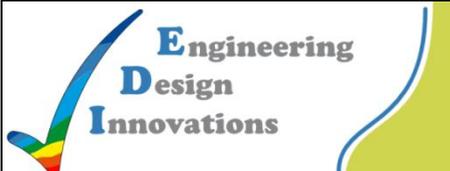
DESCRIPTION	REVISION	DATE	APPROVER
Original Issue	A	18/01/2020	E. Jaimes



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This Risk assessment has been prepared exclusively for MONITOR INDUSTRIES as part of design verification process carried out by Engineering Design Innovations Pty Ltd. Explanation of table headers and other important notes is given at the end of this document, a 5x5 risk matrix with quantitative risk scores is also included; it outlines determination and evaluation of risk scores: **Low** (1 – 5), **Moderate** (6 – 9), **High** (10 – 17), **Very High** (18 – 25). Various aspects of plant life cycle have been considered in this risk assessment.

ID	Description of Hazard		Activity	Control Measure ALREADY Implemented	Risk	Further Recommended Control Measure	Control Measure Practical?	Risk Score
	Origin	Potential consequence						
1	Uncontrolled movement of plant components.	Crushing, impact, shearing	Set up Operation Maintenance Cleaning Troubleshoot		13	Follow manufacturer’s instructions for attachment/removal of fly jib and other items of plant. Isolate power to plant and remove the main switch key when performing maintenance and cleaning tasks. Stay clear of components which may swing, or drop unexpectedly. Maintenance to be carried out by a competent person. Add crush and shear hazard decals to machine.	Yes	5
2	Lowering/raising boom.	Crushing, impact	Set up Operation Maintenance		18	Add crush hazard decal to plant.	Yes	3



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ID	Description of Hazard		Activity	Control Measure ALREADY Implemented	Risk	Further Recommended Control Measure	Control Measure Practical?	Risk Score
	Origin	Potential consequence						
			Troubleshoot			Ensure all persons are clear of moving components before performing a movement. Maintenance to be carried out by a competent person.		
3	Soft ground conditions, working near ditches and trenches, drain covers.	Overturning Crushing	Operation		22	Assess ground condition before setting up the plant; use dunnage under outriggers if necessary.	Yes	2
4	Tilt head movement	Shearing Crushing	Operation		22	Add shear hazard decal to both sides of tilt arm on half-moon plate with holes. Ensure all persons are clear of moving components before performing a movement.	Yes	3
5	Driving on steep ground.	Overturning Crushing	Driving Set up		15	Carry out job site risk assessment to determine suitability of the site before commencing any work. Avoid driving on steep ground; find alternative routes whenever possible.	Yes	1



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ID	Description of Hazard		Activity	Control Measure ALREADY Implemented	Risk	Further Recommended Control Measure	Control Measure Practical?	Risk Score
	Origin	Potential consequence						
						Never drive across steep ground, always drive with the tracks parallel to ground inclination. Do not stand on the lower side of the plant while driving on steep ground. Deploy outriggers when driving across steep surfaces.		
6	Damaged control panel / control panel cable.	Crushing Impact	Set up Operation		22	Regularly inspect control panel and cable.	Yes	2
7	Contact with overhead power lines.	Electrocution	Set up Operation Transport Emergency		22	Maintain safe distance from powerlines. Ensure overhead power is switched off, or use a spotter if working near power lines is unavoidable. Be mindful of overhead power lines on roads when transporting the plant on a vehicle. Do not move, approach or come in contact with a plant that has contacted	Yes	6



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ID	Description of Hazard		Activity	Control Measure ALREADY Implemented	Risk	Further Recommended Control Measure	Control Measure Practical?	Risk Score
	Origin	Potential consequence						
						power lines until network power has been isolated.		
8	Damaged power extension cord.	Electrocution Shock Fire	Set up Operation Maintenance Troubleshoot Emergency		4	Ensure plant and extension cord are electrically tested and tagged as per AS 3760. Do not operate/use equipment with an expired test tag. Ensure inline RCD is used when charging the batteries. Visually inspect the plant and extension lead before resetting the thermal fuse and RCD.	Yes	2
9	Power extension lead overheating.	Electrocution Shock Fire	Set up Operation Maintenance Troubleshoot Emergency		18	Use appropriate means to supply power to the plant. That is, only use extension leads rated to plant requirements. Ensure the plant's appliance inlet is regularly tested and tagged as per AS 3760	Yes	6



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ID	Description of Hazard		Activity	Control Measure ALREADY Implemented	Risk	Further Recommended Control Measure	Control Measure Practical?	Risk Score
	Origin	Potential consequence						
						Do not operate a plant with an expired electrical safety tag.		
10	Earthing fault	Electrocution Shock Fire	Set up Operation Maintenance		18	Use appropriate means to supply power to the plant. That is, use extension leads with neutral, live and EARTH wire and pin. Ensure the plant's appliance inlet is regularly tested and tagged as per AS 3760 Do not operate a plant with an expired electrical safety tag. Visually inspect the plant and extension lead before turning the power ON.	Yes	6
11	Contact with live conductors under plant cover.	Shock Electrocution	Emergency Maintenance		22	Do not touch terminals/wires inside the electric cabinet. Keep electric cabinet closed and locked at all times.	Yes	3
12	Emergency Stop not available.	Crushing Impact	Emergency Maintenance		18	Install emergency stop		



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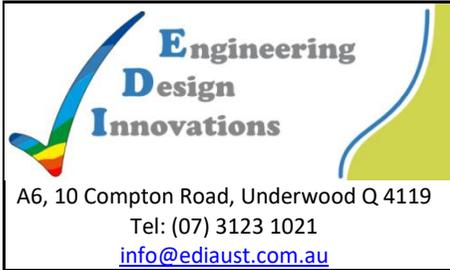
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ID	Description of Hazard		Activity	Control Measure ALREADY Implemented	Risk	Further Recommended Control Measure	Control Measure Practical?	Risk Score
	Origin	Potential consequence						
		Trauma						
13	Untrained operator, follow incorrect operating procedures.	Crushing Impact Trauma	Set up Operation Maintenance	Operation instructions explained in operator's manual	18	Train operators on safe use of the plant. Operator training should include at least the following: <ul style="list-style-type: none"> • pre-operation inspections; • Safe operation of plant; • Regular maintenance tasks; • Understanding of plant operation; • Capabilities and limitations; • Emergency procedures; Do not operate the plant unless proper training has been received. Ensure operator's manual is kept with the plant for reference.	Yes	2
14	Illness, fatigue, intoxication	Crushing Impact Trauma	Set up Operation Maintenance		18	Do not operate the plant whilst unwell, tired, under the influence of alcohol or prescription drugs which cause dizziness or affect the ability to work, or illicit drugs.	Yes	2
15	Misuse	Crushing Impact Trauma	Operation	Operator's manual warns about not using the plant for other than its intended purpose.	18	Do not use the plant for any other purpose than its intended use as explained in the operator's manual.	Yes	2



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ID	Description of Hazard		Activity	Control Measure ALREADY Implemented	Risk	Further Recommended Control Measure	Control Measure Practical?	Risk Score
	Origin	Potential consequence						
16	Unintended operation of controls.	Crushing Impact	Set up Operation Maintenance Emergency	Plant movement stops when controls are released.	17	Do not operate the plant unless trained to do so. Always double check function selection in control panel before operating a function.	Yes	6
17	Inadvertent operation of controls.	Crushing Impact	Set up Operation Maintenance Emergency		22	Keep the control panel on the control panel holder when not in use. Always depress the emergency stop button whenever the plant is not being operated.	Yes	5
18	Faulty/out of order, or poorly maintained plant.	Crushing Impact Trauma	Operation Emergency Maintenance	Operator's manual outlines plant maintenance schedule.	14	Always perform pre-operation inspection before operating the plant. Implement 'tag out' procedure to isolate faulty/out of order plants. Do not use an 'out of order' plant. Perform plant maintenance as per manufacturer's maintenance schedule.	Yes	2



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ID	Description of Hazard		Activity	Control Measure ALREADY Implemented	Risk	Further Recommended Control Measure	Control Measure Practical?	Risk Score
	Origin	Potential consequence						
						Keep maintenance records / plant log book up to date.		
19	Faulty/out of calibration load moment indicator.	Crushing Impact Overturning	Operation		19	Perform periodic testing and calibration of load moment indicator as per manufacturer's recommendations and/or local authority requirements.	Yes	2
20	Missing/unreadable decals and signs.	Crushing Impact Severing	Operation		14	Regularly inspect and replace missing or unreadable decals.	Yes	1
21	Load or parts of the crane entangled with fixed objects	Overturning	Set up Operation		22	Plan lift beforehand, determine plant and load flight path before commencing a lift operation.	Yes	3
22	Plant component movement	Crushing Impact Shearing Drawing Severing	Set up Operation Maintenance		13	Install safety barriers around the working area to prevent unauthorised access. Maintain a safe distance from moving parts of the plant. Add crush and impact hazard decals to the plant.	Yes	2
23	Poor lighting, dust.	Crushing Fatigue	Operation		17	Ensure there is adequate lighting on the job site.	Yes	3



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ID	Description of Hazard		Activity	Control Measure ALREADY Implemented	Risk	Further Recommended Control Measure	Control Measure Practical?	Risk Score
	Origin	Potential consequence						
						Do not operate the plant under poor visibility conditions.		
24	Excessive noise	Hearing loss	Operation Maintenance		17	Wear hearing protection	Yes	3
25	Exposure to sun, hot environment.	Sunburn Heatstroke Eye injury	Operation Set up Maintenance		20	Wear long sleeves, hat, trousers, sunglasses, and apply sunblock cream regularly. Keep hydrated by drinking plenty of fluids and electrolytes. Minimise exposure to sun.	Yes	3
26	Exposure to extreme cold weather.	Frostbite Hypothermia	Operation Set up		9	Wear warm clothing such as jackets, gloves and head covering when working in cold environments.	Yes	3
27	Excessive wind	Overturning Crushing Severing	Operation Set up		22	Do not operate the plant under excessive wind conditions. Know and understand plant limitations.	Yes	3
28	Lightning	Electrocution Shock	Set up Operation		15	Do not use the plant during a thunderstorm.	Yes	1



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ID	Description of Hazard		Activity	Control Measure ALREADY Implemented	Risk	Further Recommended Control Measure	Control Measure Practical?	Risk Score
	Origin	Potential consequence						
29	Explosive environment	Explosion	Operation Set up		24	Do not use the plant in an explosive environment.	Yes	3
30	Contaminants such as asbestos, fumes and biohazards.	Cancer Respiratory illnesses	Operation		22	Do not work in contaminated sites.	Yes	3
31	Other job site hazards	Slipping Falling Suffocation Crushing Burn	Operation		22	Perform job hazard and risk analysis of the job site and task to be performed. Follow a safe work method statement (SWMS) when performing high risk work activities.	Yes	6
32	Burst hydraulic hose	Crushing Overturning Burn Skin irritation	Set up Operation Maintenance	Hose burst valves fitted on lift and extension cylinders, Counter-balance valve fitted on tilt rotator.	6	Check hydraulic hose condition during periodic maintenance.	Yes	3
33	No burst hose protection on fine adjustment cylinders.	Crushing Burn Skin irritation	Operation		14	Check hydraulic hose condition during periodic maintenance. Maintain a safe distance from the load being handled.	Yes	3
34	Excessive hydraulic oil pressure.	Impact Crushing	Set up Operation	Plant fitted with pressure relief valve.	13	Check pressure settings during preventative maintenance.	Yes	1



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ID	Description of Hazard		Activity	Control Measure ALREADY Implemented	Risk	Further Recommended Control Measure	Control Measure Practical?	Risk Score
	Origin	Potential consequence						
35	Drive acceleration	Crushing Being runover	Driving	Bump stop present on drive control arm. Micro switch on spring-loaded control arm stops drive function when control arm is released as it returns to the upright position.	13	Do not drive as fast speeds. Be aware of other persons near and around the plant. Maintain visual contact with the direction of travel.	Yes	5
36	Excessive side load Ground slope sideways No protection from overload system on side loads.	Roll over Crushing	Driving Operation	Maximum side load displayed on rated capacity chart. Operator's manual obligates operators to use outriggers when handling loads on the side of the machine.	18	Make outriggers a standard item for Australian market. Always deploy outriggers when carrying a side load. Do not exceed side load capacity. Do not drive a loaded plant on ground slopes across the longitudinal axes of the plant. Do not use the overload system to measure side load, determine the weight of the load to be transported before lifting it with the plant.	Yes	3



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ID	Description of Hazard		Activity	Control Measure ALREADY Implemented	Risk	Further Recommended Control Measure	Control Measure Practical?	Risk Score
	Origin	Potential consequence						
						<p>Do not drive a speed greater than 0.4 m/s with a side load.</p> <p>Do not stand next to the lower side of the plant when driving with a load.</p>		
37	Loss of vacuum: Damaged suction cups Pump failure Vacuum Leak	Crushing Cutting Impact	Operation Driving	Plant fitted with redundant vacuum circuit. Audible alarm alerts operator when vacuum level drops below 60%.	18	<p>Test vacuum system regularly.</p> <p>Safely lower load into a safe position if loss of vacuum occurs.</p> <p>Monitor vacuum system via gauges provided.</p> <p>Maintain a safe distance from the load being handled.</p>	Yes	3
38	Vacuum pads unsuitable for the type of load being handled.	Crushing Cutting Impact	Operation		18	<p>Ensure material is non-porous, able to maintain vacuum seal, and dimensioned in such a way that its centre of gravity is within the area of suction caps.</p> <p>Add decal to plant indicating the nature of loads which can be handled by the vacuum head.</p>	Yes	3



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ID	Description of Hazard		Activity	Control Measure ALREADY Implemented	Risk	Further Recommended Control Measure	Control Measure Practical?	Risk Score
	Origin	Potential consequence						
39	Power failure (flat battery)	Crushing Being runover	Operation Emergency	Hydraulic valve bank over centre type when power is removed. Drive system brake is applied when power is removed. System shut-off valve holds vacuum after power failure.	18	Prepare emergency procedure for power failure, taking into consideration the possibility of loss of suction. Regularly check battery charge levels; stop and recharge batteries before they become flat.	Yes	4
40	Use of non-positive lifting device (vacuum system)	Crushing Impact Cutting	Operation Driving	Secondary (redundant) vacuum circuit and loss of vacuum alarm present.	14	Regularly test vacuum system	Yes	3
41	Battery charging	Burn Fire Explosion	Maintenance	Operator's Manual recommend batteries not to be charged immediately after use to reduce the risk of explosion.	22	Use appropriate charging station with good ventilation, away from ignition sources.	Yes	6
42	Overturning due to missing counterweights	Crushing Impact Cutting	Operation		18	Regularly check all counterweights are present.	Yes	2
43	Inadequate maintenance procedures.	Crushing Impact	Maintenance	Maintenance procedures included in Operator's Manual.	14	Allow only qualified service personnel to perform maintenance tasks.	Yes	2



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ID	Description of Hazard		Activity	Control Measure ALREADY Implemented	Risk	Further Recommended Control Measure	Control Measure Practical?	Risk Score
	Origin	Potential consequence						
44	Undetected structural damage (corrosion, cracks, bends, etc)	Crushing Impact Cutting	Operation		18	Regularly inspect the plant for structural damage. Carry out overload test at least once per year.	Yes	3
45	Malfunction of plant controls.	Crushing Being run over	Driving Operation	Operator instructed to carry out pre-operation testing of controls in Operator's manual.	14	Carry out pre-operation testing on controls before operating the plant.	Yes	3
46	Incorrect replacement tyre fitted.	Crushing Overturning Impacting	Operation		14	Ensure replacement tyres match the plant manufacturer specifications.	Yes	1
47	Flat tyre	Overturning Crushing Impact	Operation		18	Regularly check condition and air pressure of pneumatic tyres. Avoid driving over sharp obstacles or debris.	Yes	2
48	Failure of steering mechanism	Crushing Impact	Operation		6	Regularly inspect steering mechanism.	Yes	1
49	Boom / hydraulic system maintenance and repairs.	Crushing	Maintenance		18	Ensure boom is properly supported before carrying out any maintenance tasks to boom / boom mechanism.	Yes	2



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ID	Description of Hazard		Activity	Control Measure ALREADY Implemented	Risk	Further Recommended Control Measure	Control Measure Practical?	Risk Score
	Origin	Potential consequence						
50	Removal of batteries	Burns Musculoskeletal disorders	Maintenance		13	Use appropriate lifting techniques, perform 2 person lifting technique for heavy or awkward to reach parts. Always wear appropriate personal protection equipment when handling batteries.	Yes	3
51	Loading / unloading plant for transportation.	Crushing	Transport	Lifting procedure included in Operator's Manual.	22	Follow appropriate lifting procedure. Remove counterweights from the plant before lifting and transporting.	Yes	5
52	Unmarked lifting and tie-down points	Crushing	Transport Lifting	Lifting and tie-down points are provided.	19	Mark lifting and tie-down points on plant for correct identification.		
53	Failure of lifting and tie-down points, lifting slings and straps.	Crushing Impact	Transport	Plant is fitted with lifting and tied down points.	19	Use tie-down points provided on the plant to secure it for transportation. Ensure lifting slings and tie down straps are in good condition.	Yes	5
54	Operator working solo.	Death	Set up Operation Maintenance		19	Do not work alone.	Yes	5
55	Material break-off	Impact Severing	Operation		18	Do not stand directly under material being lifted.	Yes	2



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	Origin	Potential consequence						
		Cutting						
56	Runaway plant	Crushing	Storage Operation Setup	Drive system fitted with negative brakes which automatically engage when power is removed.	10	Check drive system during periodic maintenance.	Yes	3
57	Repositioning of suction head units.	Impact Severing	Set up		8	Wear gloves	Yes	1
58	Removal / installation of counterweights	Musculoskeletal disorders	Set up Transport		13	Take care when handling counterweights, do not lift multiple weights simultaneously to reduce the risk of back injury and muscle strain.	Yes	3
59	Collision with fixed structures.	Crushing Impact	Operation		13	Beware of any obstructions around the work area; survey the area before moving the plant.	Yes	3
60	Collision with other plant and/or pedestrians	Crushing Impact	Driving	Motion audible and visual alarm present.	13	Beware of other plant and persons around the work area, in particular when travelling around corners or blind spots. Always travel in the rearward direction.	Yes	5
61	Pulling/pushing effort	Musculoskeletal injury	Driving Operation		13	Do not attempt to pull or push the plant without using driving controls.	Yes	2



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	Origin	Potential consequence						
						Do not attempt to move loads by hand.		
62	Slippery suction contact surface	Cushing Impact	Operation	Operator's manual states contact surfaces to be dry and clean.	18	Ensure material to be lifted is dry and clean to prevent it from slipping off the suction cups.	Yes	3
63	Incompatible panel surface with suction head.	Crushing Impact	Operation		18	Do not use the plant to lift panels with porous surfaces, or incompatible with the suction head. Add decal to plant, visible from operator position, indicating the nature of loads which can be handled by the equipment.	Yes	2
64	Plant modifications after completion of risk assessment.	Crushing Overturning	Operation Set up		22	Ensure modifications made to the plant are inspected, assessed, and approved by a competent person. Review hazard analysis and risk assessment after plant modifications.	Yes	2



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RISK PRIORITY CHART

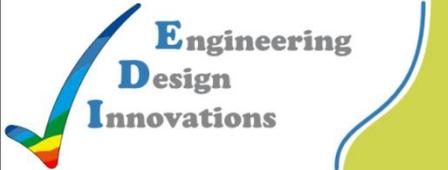
RISK PRIORITY CHART						
LIKELIHOOD		CONSEQUENCE				
		A	B	C	D	E
		Insignificant (No treatment required)	Minor (first aid treatment only)	Moderate (Medical treatment and lost time)	Major (Serious injury, specialist treatment, hospitalisation)	Catastrophic (Death, permanent disability, multiple injuries)
1	Rare (Will happen in exceptional cases)	1	3	6	10	15
2	Unlikely (Not like to occur in foreseeable future)	2	5	9	14	19
3	Possible (May occur within foreseeable future)	4	8	13	18	22
4	Likely (Likely to occur within foreseeable future)	7	12	17	21	24
5	Almost certain (Expected in most cases)	11	16	20	23	25

RISK SCORE	ACTION
18 - 25: Very high	ACT NOW
10 - 17: High	Highest management decision required urgently
6 - 9: Moderate	Do something to address the risk
1 - 5: Low	OK for now. Record and review any changes

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GENERAL NOTES

1. Table legend is as follows:
 - a) **ID.** Hazard identification number;
 - b) **Description of Hazard:** Brief description of identified hazard;
 - c) **Risk Score:** Used to prioritise risks in order of importance from 1 to 25 (4 being the highest risk score and most significant).
 - **18 - 25: Very High – ACT NOW.** Urgent, do something about the risk immediately.
 - **10 - 17: High** – Highest management decision is required urgently.
 - **6 - 9: Moderate** – Follow management instructions.
 - **1 - 5: Low** – OK for now. Record and review if any equipment/ people/ materials/ work processes or procedures change.
 - d) **Control measure ALREADY implemented:** Any control measure already in place to minimise the hazard
 - e) **Further recommended control measure:** Recommendation of control measures to be taken. All items on each hazard must be addressed in order to minimise / control the risk
 - f) **Action by: Person / entity responsible for executing the control measure**
 - OP – Refers to machine operator
 - OWNER – Refers to plant owner, entity or person responsible for the machine’s condition
 - AGENT – Refers to importer/manufacturer/installer: MONITOR INDUSTRIES
 - g) **Control Measure Implemented:** Short description of control measure implement, or comment from person / entity responsible. Include the date the control measure was implemented.
2. The list of hazards identified in this report is by no means exhaustive. Although Engineering Design Innovations Pty Ltd has made every attempt to identify reasonable foreseeable hazards, no guarantee is given as to the completeness of this risk assessment.
3. This hazard identification and risk assessment report has been prepared based on the information available at the time of publication. Persons legally responsible for the use of the plant are responsible for regularly reviewing and identifying new and existing hazards, and to apply appropriate control measures to eliminate the hazard or manage the risk. Hazard identification and risk assessment are only the first two steps of risk management; it is the responsibility of the person legally responsible for the use of the plant to complete all steps of risk management.
4. Risk assessment has been performed in accordance with guidelines published by “Worksafe Australia” (Managing the Risks of Plant in the Workplace Code of Practice), and “AS 4024.1201-2014 Safety of machinery Part 1201: General principles for design - Risk assessment and risk reduction”.

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5. Other hazards may arise due to factors such as plant deterioration due to poor maintenance, and the operator being unfit to work (due to illness, intoxication or other circumstances which will affect the operator's performance or concentration). It is the responsibility of the person legally responsible for the use of the plant to ensure it is adequately maintained, and operators are fit to work.
6. Refer to Appendix 'A' of AS/NZS 1418.10-2011 for list of hazards associated with operation of MEWPs.
7. Refer to Appendix 'L' of AS/NZS 1418.10-2011 for list of hazards associated with operation of electrically insulated MEWPs.