DRAFT 2015 Rev 02
Concrete Pumping Guidelines 2015

The Concrete Pumping Association of Australia (CPAA) is the national body representing the interests of the concrete pumping industry within Australia. Under the National Management Committee, it has developed this National Concrete Pumping Guideline (PumpSafe) and required actions to better manage education, information dissemination and engagement of industry stakeholders. The CPAA provides a strong, unified and respected voice for the concrete pumping industry across Australia whilst working to improve the professionalism, safety, standards and performance of the industry it represents. Our mission is to improve the standing of the industry by informing and educating our members through the provision of valuable advice as well as relevant products and services.

The CPAA also plays an important role in representing the concrete pumping industry to Australian governments and other stakeholders to ensure the best outcomes for members in terms of sustainability of the industry and the safety of employees.

CONCRETE PUMPING ASSOCIATION OF AUSTRALIA INC
CPAA

Table of Contents Page

FOREWARD

This document contains important information on how to operate concrete placing equipment safely, appropriately and economically. Observing these instructions helps to avoid risk, reduces repair costs and equipment downtimes, and increases the reliability and service life of the equipment.

This document only provides a summary of all the necessary information and is intended merely as a point of reference. It does not in any way claim to be a complete source of reference or to provide precise interpretations of existing legislation. There has been no classification of the hazards according to degree of injury or amount of damage to be expected. This document does not in any way act as a substitute for awareness of the relevant instructions, laws and regulations. The manufacturer's Operating Instructions must be read in conjunction with this document, and also be observed.

This document has been created on the basis of:

- EC Machinery Directive (2006/42/EC) and EN 12001 (the definitions of terms from these sources also apply to this safety manual)
- AS2550.15
- CSA, UK, ASME
- C.O.P (NSW, VIC, QLD)
- SCHWING, FLOWCRETE

Contraventions of the guidelines laid down in this document may lead to accidents and/or equipment failures, even if not expressly described. Significant damage may be caused; persons in the vicinity of the equipment could be injured or killed.

This document must be read and applied by anyone who is tasked with working with/on the equipment, and with the following in particular:

- **Operation, including setting up, fault rectification in the course of work, maintenance, disposal of functional fluids and consumables**
- **Maintenance (servicing, inspection, repair) and/or**
- **Transport.**

Purpose of this document

To provide the Concrete Pumping Industry, Principal Contractors and Key Stakeholders a "Best Practice" Guide to Safely and Successfully Pump Concrete in Australia.
These guidelines are Not Legislation and are not intended to replace any existing Australian Standards, International Standards, Codes of Practice or associated WH&S Acts or Regulations.

HOW TO USE THIS DOCUMENT

This document is made up of **07** sections

Section 1 is the *preface* of the document.
It is the introduction.

Section 2 relates to *duties*.
This provides a guide as to *'planning and risk assessment/management'* to be carried out.

Section 3 relates to *planning*.
This provides a guide as to *'what is required'* to be undertaken.

Section 4 relates to *inspection and maintenance*.
This provides a guide as to *'what is required'* to be carried out.

Section 5 relates to *operation & training*.
This provides a guide as to *'operational requirements'* to be observed.

Section 6 relates to *special works*.
This provides a guide as to what *'additional requirements'* can exist.

Section 7 relates to *supporting documents*.
This provides a guide as to what *'checklists'* should be used.

Concrete pumps are an effective and efficient means for moving and placing concrete. Concrete pumping is a process that is widely used to deliver pre-mixed concrete and is also utilised in the manufacture of pre-cast and tilt-up panels, concrete formwork, slab construction, concrete paving and concrete spraying.

A person conducting a business or undertaking (PCBU) in the construction, concrete pumping and concrete supply industries must be aware of their responsibilities to provide a safe work environment and to prevent harm to workers, as required under State jurisdiction's Work Health and Safety legislations and regulations[1] (WH&S legislation).

This Industry Standard provides guidance for the safe operation and maintenance of concrete pumping equipment. It aims at ensuring that a safe work environment is provided when utilising concrete pumps. They are not a comprehensive design, maintenance and operation manual. If you require a comprehensive design, maintenance and operational manual it is recommended that you refer to the concrete pump manufacturers' manual.

This document includes various references to provisions that may be provided in jurisdictional WH&S legislation, which may outline legal requirements.

The words 'must', 'requires' or 'mandatory' indicates that a legal requirement exists and must be complied with. These references are not exhaustive and it is recommended that they be checked for jurisdictional differences.

Objects of CPAA

VISION: *The Concrete Pumping Association of Australia provides a strong, unified and respected voice for the Concrete Pumping Industry across Australia, while working to improve the professionalism, safety and quality of the industry it represents.*

INSERT A NARRATIVE -

References

National

AS 1418.15-1994 Concrete Placing Equipment
AS 2550.15-1994 Safe use – Concrete Placing Equipment
Workplace health and Safety ACT 2011
Workplace health and Safety Regulations 2011
How to manage work health and Safety Risks Code of Practice 2011

ACT

NSW

Concrete Pumping Code of Practice Cat No 305

QLD

Concrete Pumping Code of Practice 2005

Electrical Safety Act 2002

VIC

SA

WA

TAS

NT

SECTION 1

1.0 - DEFINITIONS

Australian Standard means a standard, rule, code or specification of the Standards Association of Australia.

Clean out adaptor means a short length of pipe with one end blanked off and connections for a water or air hose coupled to the pipeline for cleaning purposes. It should have a separate air relief valve vented to atmosphere and a pressure gauge when used with compressed air.

Competent person means a person who the pump operator ensures (prior to appointment) has current skills and knowledge either through training, qualification, or experience or a combination of those, who is industry based, and who may have obtained training certification from the appropriate manufacturer to have the knowledge and skill to enable that person to correctly perform the task required.

Concrete/Formwork contractor is the person contracted to install formwork and/or to finish the pumped concrete.

Concrete pump is the equipment that applies pressure to the concrete and forces it through the delivery pipes and hoses.

Concrete pumping pressure means the pressure exerted by the pump on the concrete at the piston head.

Condition of tipping means a pump should be considered to be in the condition of tipping when the stability moment equals the overturning moment.

Coupling system means the connecting sections of a delivery pipeline.

Delivery hose means a flexible hose used in or at the end of the pipeline.

Hopper is the loading reservoir of a concrete pump.

Hose-hand the worker that controls the end-house.

Line pump is the concrete pump connected to a pipeline system.

Worker representative means any worker, member of a health and safety committee or a person elected by the workers at a place of work to represent them on health and safety matters.

Outriggers means extendible structural members on the pump unit that increase the dimensions of the base to ensure the stability of the pump in set up, dismantling and use.

Person conducting a business or undertaking (PCBU) conducts a business or undertaking alone or with others. The business or undertaking can operate for profit or notfor- profit. The definition of a PCBU focuses on the work arrangements and the relationships to carry out the work. In addition to employers, a PCBU can be a corporation, an association, a partnership or sole trader. A volunteer organisation which employs any person to carry out work is considered a PCBU.

Person in control of relevant workplace area means:

a) The person who is the owner of the relevant workplace area.

b) However, if there is in place a lease, contract or other arrangement that provides, or has the effect of providing for another person to have effective and sustained control of the relevant workplace area, the other person, and not the owner, is the 'person in control' of the relevant workplace area.

Pipeline system is a delivery system that uses rigid or flexible pipe section coupled together to deliver concrete.

Placing boom means a powered device to support and position a concrete delivery pipeline, which may incorporate folding, luffing, extending and/or slewing motions.

Principal contractor means:

a) For a construction workplace (other than a construction workplace for domestic premises):

   i The person appointed as principal contractor by the owner of the workplace.

   ii If no principal contractor is appointed – the owner of the workplace.

b) For a construction workplace for domestic premises – the person in control of building or demolition work at the workplace.

Professional engineer means a member or person eligible for membership of the Institution of Engineers Australia.

Pump unit means the concrete pump, placing booms and associated equipment, this can be mobile and mounted to a truck, or static when connected to a tower boom.

Pump operator means the PCBU of a concrete pumping business engaged by a principal contractor, subcontractor or person in control of a workplace to pump concrete.

Reducer means a pipe that changes the internal diameter of the pipeline.

Relevant workplace area means:

a) Any building or other structure, or a part of a building or other structure, used as a workplace.

b) Any area adjacent to the building or other structure or part that is associated with the use of the building or other structure, or part of a workplace.

Reasonably practicable means that which is, or was at a particular time, reasonably able to be done to ensure health and safety, taking into account and weighing up all relevant matters including:

a) the likelihood of the hazard or the risk concerned occurring

b) the degree of harm that might result from the hazard or the risk

c) what the person concerned knows, or ought reasonably to know, about the hazard or risk, and ways of eliminating or minimising the risk

d) the availability and suitability of ways to eliminate or minimise the risk, and

e) after assessing the extent of the risk and the available ways of eliminating or minimising the risk, the cost associated with available ways of eliminating or minimising the risk, including whether the cost is grossly disproportionate to the risk.

NOTE:

(1) Use of the singular does not exclude the plural (and vice versa) when the sense allows.

(2) Although the intended primary application of this Document is stated in its Scope, it is important to note that it remains the responsibility of the users of the Document to judge its suitability for their particular purpose.

(3) This publication was developed by consensus.

Consensus implies much more than a simple majority, but not necessarily unanimity". It is consistent with this definition that a member may be included in the Technical Committee list and yet not be in full agreement with all clauses of this publication.

(4) CPAA Documents are subject to periodic review, and suggestions for their improvement will be referred to the appropriate committee.

(5) All enquiries regarding this Document, including requests for interpretation, should be addressed to CPAA (insert address). Requests for interpretation should

(a) define the problem, making reference to the specific clause, and, where appropriate,

include an illustrative sketch;

(b) provide an explanation of circumstances surrounding the actual field condition; and

(c) be phrased where possible to permit a specific "yes" or "no" answer.

Interpretations are processed in accordance with the regulatory directives and guidelines.

2.0 – THE COMPETANT PERSON

A Competent person can be defined as:

A person who through formal training, professional experience and recent activity has the required knowledge to inspect concrete pumps and placing booms, and is conversant with the manufacturer's current safety bulletins (if any).

A person must have the following prerequisites for supervising the *'annual'* or *'specified'* inspection:

(a) A professional engineer,

NOTE: Professional engineer is defined in AS 2550.1

or

(b) Have at least 5 years of relevant industry experience, which has comprised of involved participation in the inspection of concrete pumps and placing booms.

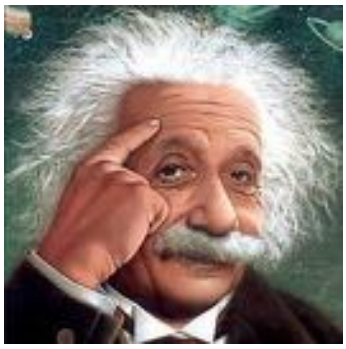
and

(c) Possess a thorough knowledge of the relevant health and safety regulations;

(d) Have access to the necessary equipment and personnel to carry out the inspection;

(e) Be conversant with all the various manufacturer's current safety bulletins (if any);

(f) Be able to carry out the task impartially;



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NOTE:

What the competent person must be qualified in varies by situation, and most Manufacturers will have their own individual structural inspection and repair requirements, so no matter what any standard says or whatever else they are qualified in, they will not be Manufacturer approved unless they are factory trained, accredited and approved by the Manufacturer.

2.2 General principles on who is a competent person

Requirements may be different for different concrete pumping equipment

All relevant factors must be considered in determining whether a person is competent to maintain, inspect or test concrete placing equipment, for example the type of concrete placing equipment and hazards associated with the equipment. If there is more than one kind of concrete placing equipment in use at a workplace, then it is possible that a varying range of competent persons may be required to maintain and inspect the different items.

A person who maintains or inspects concrete placing equipment is not expected to be an expert in every aspect of the concrete placing equipment and engineering. However they should be able to identify the scope of their expertise and advise relevant persons if further expertise is necessary for a particular job to be carried out properly (for example in relation to pressure, hydraulic and pneumatic components requiring specialist attention).

Separating maintenance and inspection activities

It is recommended the competent person inspecting concrete placing equipment is different to the person who usually maintains the concrete placing equipment, so there is less risk of complacency from being over familiar with the concrete placing equipment.

2.3 Records to keep

Log books and inspection record sheets

a) Instruction manuals that give sufficient instructions for operation, maintenance and repairs should accompany the pump unit and/or boom;
b) Maintenance and repair manuals including a parts manual are to be kept in a safe place at the registered premises;
c) The operator should be familiar with the contents of the instruction manual, which should be available at the site of operation;
d) All manuals should be kept up-to-date with any additional information from the manufacturer;
e) Pump maintenance logbooks are to be kept up-to-date, and be available on request at the workplace.

HOW CAN I TELL IF SOMEONE IS A COMPETENT PERSON?

The following questions should be considered when deciding if a person has the skills, knowledge and experience to maintain, inspect or test concrete placing equipment at a workplace:

SECTION 2

3.0 – DUTIES

WHO HAS DUTIES:

A PCBU has the primary duty under the WH&S legislation to ensure, as far as reasonably practicable, that workers and other persons are not exposed to health and safety risks arising from the business or undertaking.

Officers, such as company directors, have a duty to exercise due diligence to ensure that the business or undertaking complies with WH&S legislation. This includes taking reasonable steps to ensure that the business or undertaking has and uses appropriate resources and processes to provide and maintain a safe work environment.

Workers have a duty to take reasonable care for their own health and safety and that they do not adversely affect the health and safety of other persons. Workers must comply with any reasonable instruction and cooperate with any reasonable policy or procedure relating to health and safety at the workplace.

INSERT NARRATIVE

3.1 CONSULTATION

3.1.1 Consultation with workers

Consultation involves sharing of information, giving workers a reasonable opportunity to express views and taking those views into account before making decisions on health and safety matters.

The WH&S legislation requires that PCBUs consult, so far as is reasonably practicable, with workers who carry out work for the PCBU and who are (or are likely to be) directly affected by a work health and safety matter.

If the workers are represented by a health and safety representative, the consultation must involve that representative.

You must consult your workers when proposing any changes to the work that may affect their health and safety.

3.1.2 Cooperating and coordinating activities with other duty holders

The Act requires that you consult, cooperate and coordinate activities with all other persons who have a work health or safety duty in relation to the same matter, so far as is reasonably practicable.

Sometimes you may share responsibility for a health and safety matter with other PCBUs who are involved in the same activities or who share the same workplace. In these situations, you should exchange information to find out who is doing what and work together in a cooperative and coordinated way so that all risks are eliminated or minimised as far as reasonably practicable.

Further guidance on consultation is available in the Code of Practice: Work Health and Safety Consultation, Coordination and Cooperation.

4.0 - RISK MANAGEMENT

GENERAL

Aim: To ensure that workers and others are provided with the highest level of protection that is reasonably practicable.

Key Requirement: Duty holders in managing risks are responsible to:

- Identify hazards that could give rise to risk;
- Eliminate risks and if not practicable, minimize those risks; and
- Maintain, review and revise control measures that have been implemented.

An integral part of the planning process is the early and then ongoing identification of hazards, assessment of associated risk and the instigation of appropriate controls. *ISO 31000 2009 Risk Management* and legislative requirements (*WHS Act 2011, WHS Regulation 2011, WHS CoP How to Manage Workplace Health and Safety Risks*) form the basis of the methodology used in determining & assessing the levels of identified risk. Risk is assessed as High, Medium or Low using a standard 'Risk Assessment Matrix' shown on the following page (i.e. consequence of risk if it occurs versus the likelihood of the risk occurring). Where the risk is identified in the high or medium ranges, additional steps are to be put into place such as the development of Safe Work Method Statements (SMWS) or Safe Operating Procedures (SOP's) that include specific controls to be used to manage hazards.

Hazard Identification, Risk Assessment and risk Control (HIRAC) training shall be undertaken by senior management including Managers and Supervisors to ensure competence in the use of the HIRAC methodology. Workers shall be assisted by the **Works Supervisor** and external consultants as required.

A combination of controls may be necessary if no single measure is enough to reduce the risk to the lowest level reasonably practicable.

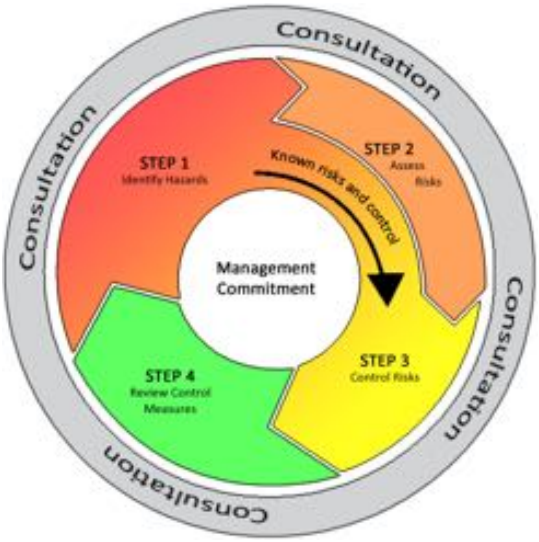
Risk Management is covered by reference to and implementation of:

- *Principal Risk Assessment (PRA)*
- *Safe Work Method Statements/Safe Operating Procedures*
- *JSA – Job Safety Analysis*

In summary, these procedures provide for the identification of hazards and the assessment of risk within the various work activities. All workers are required to assist in the identification of risks/hazards, development of appropriate controls and the implementation of safe work practices.

4.1 Managing Risk Step-by-Step Process:

Identify Hazards	Find out what could cause harm;
Assess risks	If necessary – understand the nature of the harm that could be caused by the hazard, how serious the harm could be and the likelihood of it happening;
Control risks	Implement the most effective control measure that is reasonably practicable in the circumstances; and
Review control measures	To ensure they are working as planned.



4.1.1 Managing Risk – deciding what is reasonably practicable

In deciding what is reasonably practicable to protect people from harm requires taking into account and weighing up all relevant matters including:

- The likelihood of the hazard of the risk occurring;
- The degree of harm that might result from the hazard or risk;
- Knowledge about the hazard or risk, and ways of eliminating or minimizing the risk;
- The availability and suitability of ways to eliminate or minimize the risk; and
- After assessing the extent of the risk and the available ways of eliminating or minimizing the risk, including whether the cost is grossly disproportionate to the risk.

Have well established and acceptable control measures in place. The majority or hazards and their associated risks are well known and control measures are consistently implemented. Should an unforeseen hazard arise, carry out a risk assessment, update the risk register and communicate the additional controls as appropriate.

4.1.2 Consulting Workers in Relation to Risks

Responsibilities are as follows:

- Consult as far as reasonably practicable with workers who carry out work or are likely to be directly affected by a work health and safety matter; and
- Consult, co-operate and co-ordinate activities with all other persons who have work health or safety duty in relation to the same matter, so far as is reasonably practicable.

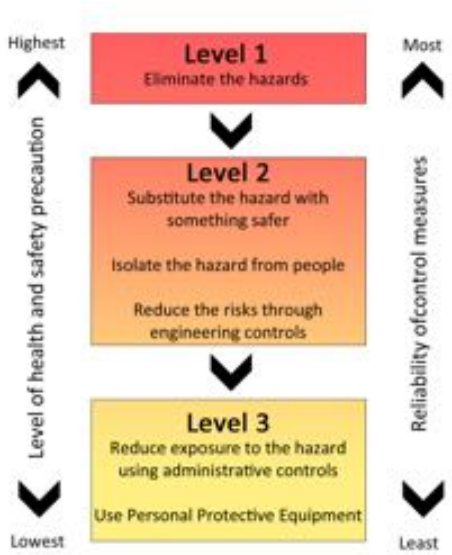
In deciding how to control risks, consult with workers and their representatives who are likely to be affected by the decision.

This shall be achieved through established procedures for communication and consultation.

4.1.3 Hierarchy of Risk Control

The ways of controlling risks are ranked from the highest level of protection and reliability to the lowest as show in Figure 2. This ranking is known as the hierarchy of risk control. Work through this hierarchy when managing risk.

Always aim to eliminate the hazard. If this is not reasonably practicable, minimize the risk by working through other alternatives in the hierarchy as follows:



Level 1 Control Measures

The most effective control measure involves eliminating the hazard and associated risk. The best way to do this is by, firstly, not introducing the hazard in the workplace. For eg, eliminate the risk of a fall from height by doing the work at ground level.

Aim to eliminate risks by removing the hazard completely, for example, by removing trip hazards on the floor or disposing unwanted chemicals.

It may not be possible to eliminate a hazard if doing so means that we cannot make the end product or deliver the service. If the hazard cannot be eliminated, then the Site Supervisor shall aim to eliminate as many of the risks associated with the hazard as possible.

Level 2 Control Measures

If it is not reasonably practicable to eliminate the hazards and associated risks, minimise the risks using one or more of the following approaches:

- Substitute the hazard with something safer. For instance, replace a hazardous substance with a non hazardous alternative;
- Isolate the hazard from people - This involves physically separating the source of harm from people by distance or using barriers. For instance, install guard rails around exposed edges and holes in floors, use remote control systems to operate machinery, store chemicals in a fume cabinet etc; or
- Use engineering controls - An engineering control is a control measure that is physical in nature, including a mechanical device or process. For eg, use mechanical devices such as trolleys or hoists to move heavy loads, place guards around moving parts of machinery, install residual current devices (electrical safety switches), set work rates on a production line to reduce fatigue.'

Level 3 Control Measures

These control measures do not control the hazard at the source. They rely on human behaviour and supervision, and used on their own, tend to be least effective in minimising risks. Two approaches to reduce risk in this way are:

- Use administrative controls - Administrative controls are work methods or procedures that are designed to minimise exposure to a hazard. For instance, develop procedures on how to operate machinery safely, limit exposure time to a hazardous task, use signs to warn people of a hazard.
- Use personal protective equipment (PPE)
- Administrative controls and PPE should only be used:
- When there are no other practical control measures available (as a last resort);
- As an interim measure until a more effective way of controlling the risk can be used; or
- To supplement higher-level control measures (as a back up)

4.2 SAFETY EQUIPMENT

4.2.1 Provision of personal protective equipment (PPE)

Personal protective equipment is the least effective method for controlling risk, however in many circumstances associated with the pumping of concrete this is the most practicable option. Before beginning any pumping operation, the concrete pump operator and the principal contractor or person in control of the workplace, should assess the conditions likely to affect the health and safety of workers and arrange for the provision and use of appropriate personal protective equipment.

The following items of PPE are required when pumping concrete:

(a) safety helmets,
(b) eye protection,
(c) safety vest,
(d) rubber safety boots.

The following items of PPE may also be required when pumping concrete:

(e) hearing protection,
(f) gloves.

4.2.2 Additional equipment

Each pump unit should be equipped with the following items.

(a) first aid kit (must include eye wash)
(b) protective creams
(c) fire extinguishers (as appropriate)
(d) sufficient reflective traffic cones (minimum 450mm high), and
(e) signs e.g. exclusion zone and use of high visibility vests.

4.3 PLANT AND EQUIPMENT

Insert Narrative + Images

The interruption of concrete flow and/or failure of pumping equipment can create potentially dangerous situations. Pressurised concrete escaping from the enclosed pumping system has the potential to strike workers and others, causing injury. Dislodged, unrestrained or burst pipelines and associated equipment also pose a risk to concrete pumping workers, delivery truck drivers and other workers working in and around the designated concrete pumping area. Risks associated with this plant should be identified in terms of pipe construction and pipe restraint.

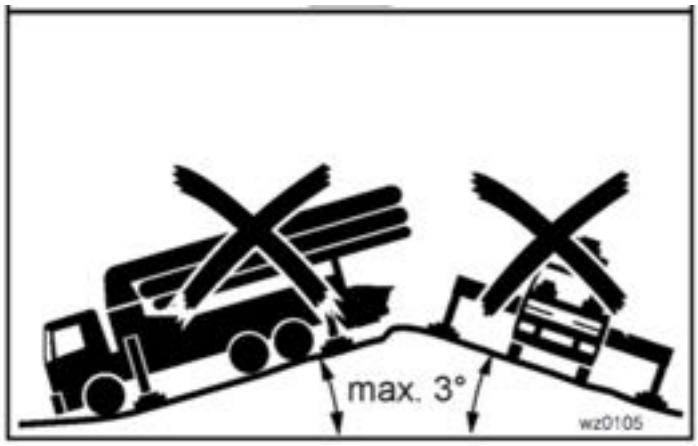
The risk of mechanical or structural failure of equipment such as concrete placement booms should be identified. Concrete placement booms can have a greater risk of failure due to the cyclic loading of the pulsating pump. The likelihood of fatigue failure of welds is increased in comparison to other plant that does not have this pulsating load. Restraining devices such as pins and circlips also have an increased chance of becoming dislodged. These risks apply to both truck mounted and satellite type booms (building mounted booms).

The information supplied below deals with components of the concrete pumping system. Specific risk controls are recommended for each of these components. The assessment of risk for these hazards remains essentially the same in identifying components and assessing the likelihood of movement or failure.

Set-up

The machine must be made level in all directions. The maximum permitted deviation from the horizontal is 3°.

Note: Greater deviations from the horizontal may overload the slewing gear for the placing boom and jeopardize the stability of the machine.



4.4 PIPES, CLAMPS, SAFETY PINS AND ANCHORS

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4.5 PLACEMENT OF CONCRETE PUMPING EQUIPMENT

Insert Narrative + Images

Two trucks on a pump

Hazard Identified

Where insufficient access exists for a two pump feed the likelihood and consequence of injury is significant.

Risk 1

Crush – No room to move, restricted access, other machines reversing or inadequate guidance.

Risk 2

Fall - Climbing onto the rear guards of adjacent truck to access mixer controls.

- Not always able to use 3 points of contact andcorrect ladder use to check load.
- Where guidance is inadequate on two truck feed discharging the driver is required to assist in some cases by standing on pump platforms.

Note that no-one is permitted to stand or walk on the hopper grate when the pump is working.

Risk 3

STRIKE - Hopper burping or pipe bends blowing out. Restricted access at the rear of the pump may require the operator to remain in a zone of significant hydraulic pressure, and where there is inadequate means of egress.

Risk 4

ERGONOMIC - Restricted access may result in injury during chute adjustment.

Risk Reduction Measures

1) No one should ever stand between a reversing truck and the pump or nearby stationary object.
2) A minimum clearance of 600 mm must be maintained between trucks or other stationary objects.
3) A safely located traffic controller (spotter) must assist reversing trucks.
4) Permit only one truck at a time at the pump if a spotter cannot be provided, or a 600mm clearance cannot be achieved.

Ongoing Actions

- Drivers and customers must be informed about these hazards and the risk in a proactive manner.
- Make this an agenda item at safety meetings.

4.6 SETTING UP NEAR POWERLINES OR ELECTRICAL EQUIPMENT

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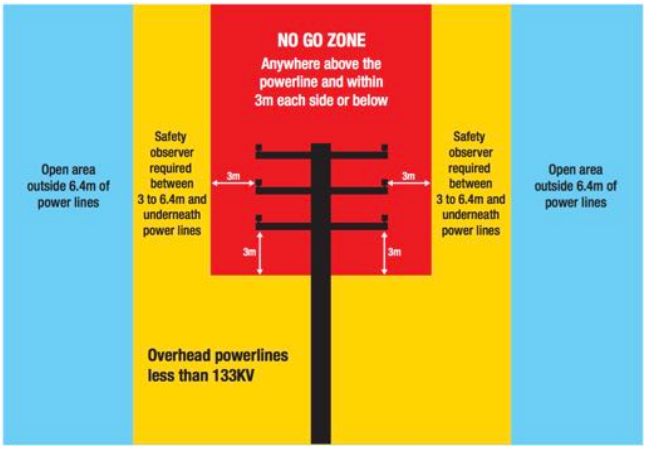

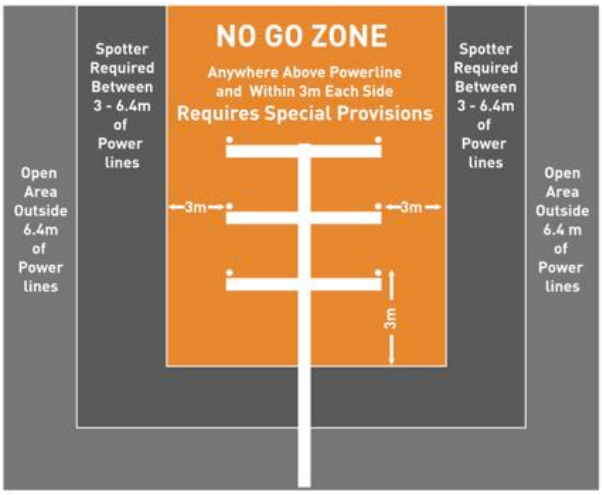

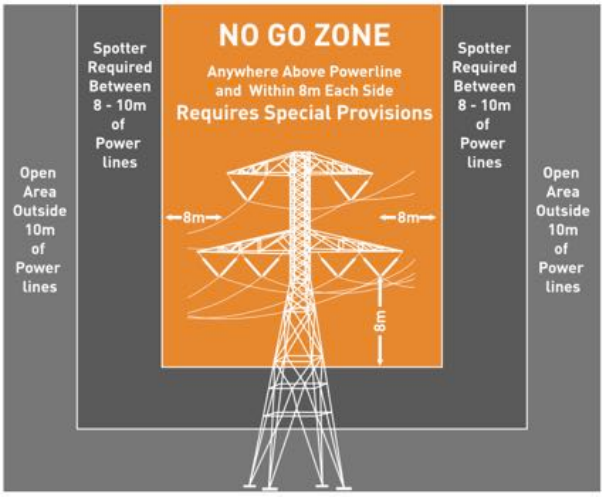

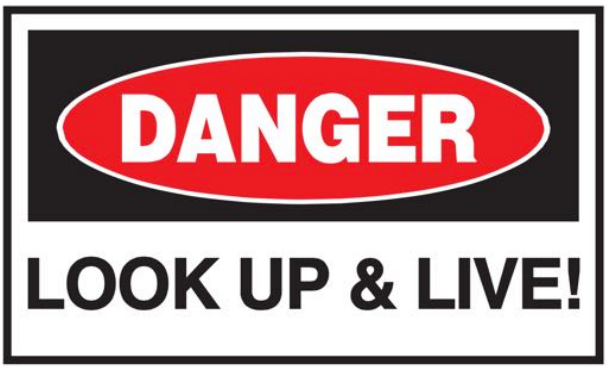

EARTH CHAINS

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4.7 SETTING UP IN A PUBLIC PLACE

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SECTION 3

5.0 – PLANNING

The PCBU or the principle contractor in charge of the construction site is responsible for providing a safe work environment for all workers.

Planning and preparation is the first step in ensuring that work is done safely and in order to be successful must involve consultation with all those engaged in the work.

(Refer 11.2 PUMPSAFE – Site Safety Checklist)

5.1 - PLANNING BY THE BUILDER

When planning for the pumping of concrete the principal contractor or person in control of the workplace should consult with the concrete pumper regarding risks. The principal contractor or person in control of the workplace should ensure:

(a) the concrete pump is located in the most favourable position to pump concrete, including allowing adequate visual contact for the pump operator with both the pump and the pour area. If this cannot be achieved then alternative controls should be implemented

(b) a clear, level area of ground with a firm base that is capable of supporting the pump unit and the concrete delivery trucks, is available

(c) clear access to the pump unit for concrete trucks

(d) safe and unobstructed access for the general public, to public areas in the vicinity of the pumping unit and the delivery trucks, if the pump unit is set up in the street

(e) a time schedule is set prior to a major pour commencing, based on a realistic assessment of the time to complete

(f) an allowance is included for such things as weather, accessibility, volume of concrete, slab & site limitations, equipment back up, restricted work times (local council rules), equipment capacity, concrete pumper's capacity, hose-hand's limitations and the concrete supplier's requirements

(g) that there is a clearly defined 'pump washout area' complying with environmental protection legislation and local authority requirements

(h) where compressed air and water lines are supplied on site, that they are positioned to avoid any damage and to comply with the appropriate Australian Standards, and

(i) there is a method to collect concrete residue and/or all necessary precautions necessary to prevent wash down residue from the clean-up of pumping operations finding its way into stormwater drains (including concrete delivery trucks), particularly where a permanent or semi-permanent set-up has been established on site or where a pump is set-up in a roadway or public place, and ensuring that this residue collection method complies with all Environment Protection Authority requirements.

5.2 - PLANNING BY THE CONCRETE PUMPER

The concrete pumper should be consult with the principal contractor or person in control of the workplace in with regard to the overall planning for pumping concrete on site. Following this consultation the concrete pumper must consider:

a) Whether enough workers are available to safely pump concrete, including having a competent worker present at the pump at all times, to operate the emergency shut down system, in case of line failure or other events that require the pump to be shutoff

   i. Unless the concrete pump is provided with an automatic system that effectively and reliably shuts down the pump when there is a likelihood of air entering the system.

b) The most suitable method of pumping concrete to the pour area;
c) The capacity and type of pump to be used to complete the job satisfactorily within the required time span;
d) The location of the pump and access for concrete delivery trucks;
e) An assessment of any manual tasks that may cause any muscle or ligament strains, or other injures;
f) The provision of personal protective equipment and other safety equipment;
g) The provision of safe access including elimination of trip, slip and fall hazards;
h) Electrical safety, including the location of nearby power lines and systems of work which comply with electrical safety legislation and the recommendations of any local, relevant compliance requirements;
i) Appropriate instruction manuals accompany the pump unit and/or boom, giving sufficient instructions for operation, maintenance and repairs;
j) The pump operator is trained and competent with the use of the appropriate manuals and the equipment;
k) Maintenance and repair manuals are kept in a safe place at the registered premises, including a parts catalogue, and are kept up to date with any additional information from the manufacturer; and
l) Maintenance log books are to be kept on the pump, maintained and be up to date, and are to be made available on request at the workplace.

ALSO CONSIDER POINTS FROM THE FOLLOWING:

- Road permits
- Records of pump inspections and maintenance (both carried out and/or planned)
- Plant item registration (where applicable)
- PumpSafe certification scheme (where applicable)
- Operator checklists

The concrete pumper should also consult with the concrete delivery company and truck driver prior to the commencement of pumping. Issues to be discussed could include:

A. With the delivery company include:

i. Control measures chosen and implemented for line blow-out procedures, based on a risk assessment;
ii. Procedures for multiple trucks (2-truck feed) reversing to the concrete pump.

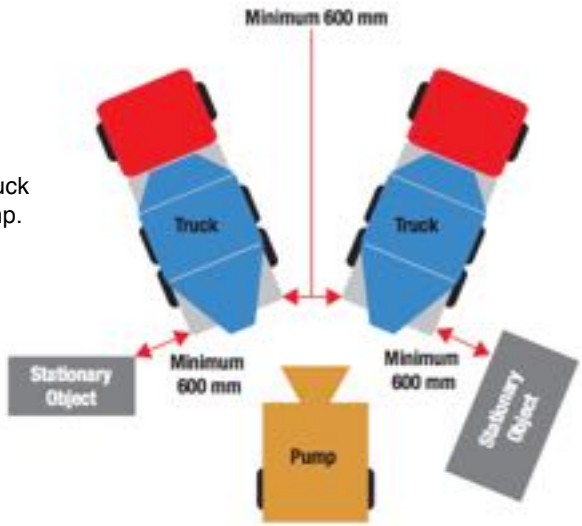


Image caption of 2-truck feed

B. With the truck driver include:

i. A safe location for the concrete delivery truck driver to stand, when concrete pumping is occurring;
ii. The need to follow any directions of any allocated traffic controllers/spotters;
iii. Procedures for multiple trucks (2-truck feed) reversing to the concrete pump.

5.3 - PLANNING BY THE CONCRETE SUPPLIER

Additions to the agitator load (colour, silica fume, etc.)

- Only the driver is to add water or other products to the agitator load, in accordance with appropriate approvals.
- Add no other products without the written approval of the premixed concrete supplier.
- The addition of bagged or liquid products to the load can only be done if adequate and safe access is provided.
- Bagged products must be sealed and the bags dissolvable.

The concrete supplier must consult with the principal contactor and concrete pump operator, and any other relevant PCBU, to ensure that all matters regarding the safe delivery of pre-mixed concrete is organised.It is recommended that this should include checking with the principal contractor that the concrete boom being utilised on the site is registered and design compliant.

When delivering concrete on site the driver must follow the directions of the worker responsible for controlling traffic at the site and in charge of the discharge of the concrete. This is particularly important when there is more than one truck discharging or manoeuvring at the site.

The driver must stay clear, where practicable, of all pump lines and couplings, wear the required PPE and report any safety problems or issues to the pump operator and the principle contractor.

Sales person should utilise the Customer Safety Agreement when tacking pre-mixed concrete orders. Please refer to the example at Appendix 4.

What is required of the concrete truck driver

- Follow all site Work Health Safety (WH&S) requirements including PPE.
- Mandatory additional PPE for discharging into a pump are safety glasses and hearing protection.
- The concrete delivery driver must be licensed, competent and comply with fatigue management rules.
- Report any uncontrolled hazards to the customer or contractor and company supervisor.
- Ensure that the truck reverse warning system is operational.
- When being directed on site do not continue if the spotter cannot be clearly seen NO SEE – NO MOVE.
- Seek assistance from a responsible person either on site or at the plant if there are any safety concerns.
- Ensure that wheels are free of material when exiting the construction site.

6.0 – SELECTION AND TRAINING OF WORKERS

EQUIPMENT OPERATION

6.1 Qualifications of operators

Machines shall be operated only by persons who have the appropriate medical and physical qualifications (*see Extract below*) and are trained or in training to operate the applicable type of pump and boom equipment. Trainees must be under the direct supervision of a designated person.

Model criteria for determining medical and physical qualifications of concrete pump and boom operators

Note: ***This Model criterion is not a mandatory part of this document.***

General

The following criteria should be taken into consideration in determining the medical and physical qualifications of concrete pump operators:

(a) Vision:
- **(i) Sufficient visual acuity for reading signs, labels, and written instructions pertaining to the job;**
- **(ii) Sufficient ability to distinguish colours;**
- **(iii) Sufficient peripheral vision;**
- **(iv) Sufficient spatial perception (including depth, height, and distance); and**
- **(v) Normal vision, with or without corrective lenses;**

(b) Hearing:
- **(i) Sufficient aural acuity for hearing applicable warning signals; and**
- **(ii) Aids necessary for normal hearing (if applicable);**

(c) Other capabilities:
- **(i) Absence of physical impairments, neurological disorders, and other health disorders that could affect the safe operation of the pump; and**
- **(ii) Sufficient strength, endurance, agility, and coordination to meet the demands of the job (including, if applicable, sufficient ability to move the neck, upper and lower limbs, and trunk).**

Maintenance personnel and inspectors shall have comprehensive knowledge, and demonstrated competence, (*refer 2.0*) for maintenance purposes, in the operation of the machines that they will be servicing or inspecting. Operation of the machines by maintenance personnel or inspectors shall be limited to the functions necessary, as applicable, for maintenance, inspection, or verifying the performance of a machine after maintenance or inspection.

Only designated persons shall be allowed on the machines.

6.2 Operator conduct

The following requirements apply to operator conduct:

(a) Operators must operate machines in accordance with the manufacturer's recommendations. When such recommendations are not available, the competent persons directions will apply.

(b) The operator of a machine must have full control of the pump or placing boom controls whenever the machine is operating and must not engage in any other activity while operating the machine.

(c) The operator must respond to signals from a designated spotter. However, the operator must obey a stop signal from any person.

(d) The operator must not leave controls unattended or engage in distracting activities when a machine is operating without first disabling it in accordance with the manufacturer's recommendations.

(e) The manufacturer's recommendations for securing the boom must be followed when the site weather conditions exceed the manufacturer's operating parameters.

(f) Operators must be familiar with the equipment and its proper care. Operators shall promptly report any need for adjustments or repairs, and any potentially hazardous conditions, to a designated person, and discontinue use of the equipment if the risk is imminent.

(g) All controls must be tested by the operator at the start of a new set-up. If a control fails to operate properly, and the failure could create a hazard, the control must be adjusted or repaired, as applicable, before operations begin.

(h) The manufacturer's placing boom assembly and disassembly procedures must be followed. In the absence of such procedures, the directions of a qualified person must be followed.

(i) Jacking, mounting, and dismantling of separate placing booms and masts must be performed only by qualified persons.

(j) When removing pins or bolts from a detachable boom, workers must stay clear of the area under the boom.

(k) Every outrigger must be visible to the operator or to a spotter during extension, slewing, or jacking.

(l) The operator must assess site hazards before set-up.

(m) The operator must not set up or operate the machine when set-up or operation will create a hazard.

Note: ***Operators should be aware that the stability of a machine can be affected by wind, ground conditions, boom length, operating speed, etc, and that residual pressure can remain even after reverse pumping.***

6.3 General operating practices

Concrete pumps and placing booms must

(a) not be used as cranes or hoists to lift objects or other loads;

(b) not be overloaded by

- (i) hanging system pipe or hose beyond the manufacturer's specifications;
- (ii) installation of boom pipe, elbows, or clamps heavier than manufacturer's specifications;
- (iii) attachment of pipeline directly to the boom tip elbow without a flexible delivery hose that allows boom movement; and
- (iv) securing of the boom to a fixed object;

(c) be operated with outriggers fully deployed and leveled in accordance with the manufacturer's procedures except as permitted in Clause 6.3.1;

(d) not be used to drag hose or a separately laid delivery system;
(e) not be operated without a sling or cable attaching each piece of hanging delivery system to the boom;
(f) not be moved to different locations unless the boom and outriggers are stowed in the transport position or as directed by the manufacturer;
(g) not be operated during an electrical storm;
(h) not be operated when the wind force exceeds the manufacturer's recommendations for safe operation; and
(i) not be operated above or below the ambient temperature recommended by the manufacturer.

6.3.1 SHORT RIGGING

Short-rigging may be used only if

(a) it has been determined that short-rigging is unavoidable;
(b) the boom is not operated beyond the area of fully extended outriggers (*see Figure below*) unless the boom/outrigger control system is range limiting;
(c) any outriggers still retracted are jacked and the unit is leveled in accordance with the manufacturer's recommended procedures; and
(d) the manufacturer's or competent person's documented procedures are followed; and
(e) the manufacturer does not expressly state that it is not recommended.

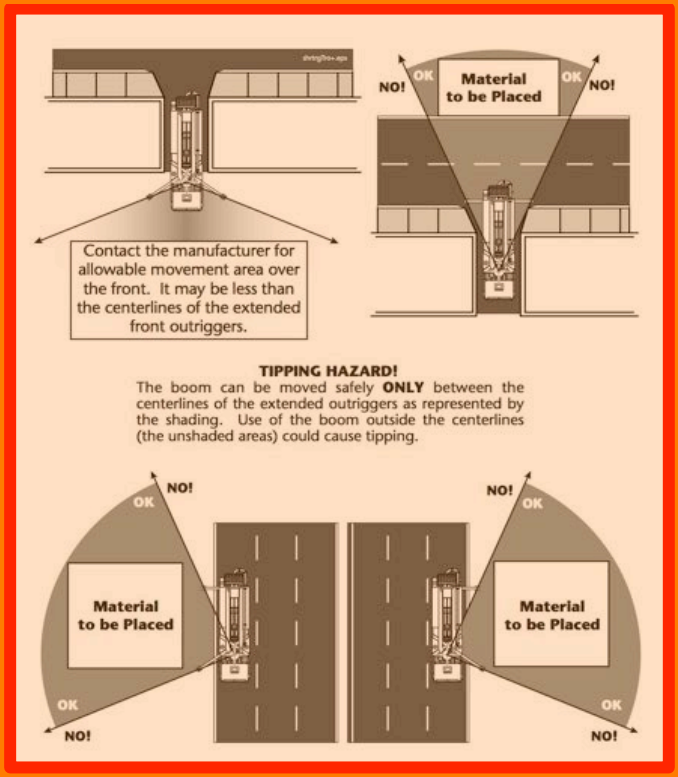


Image caption – Short rigging

The ground, foundation, or structure that is to support the unit must be strong and stable to support the force applied by the fully loaded boom over any outrigger that will be subjected to that force as shown on the affixed outrigger label.

Outrigger pads, cribbing, and dunnage with dimensions corresponding to the bearing capacity of the ground must be placed under the outriggers to distribute the load evenly over the ground.

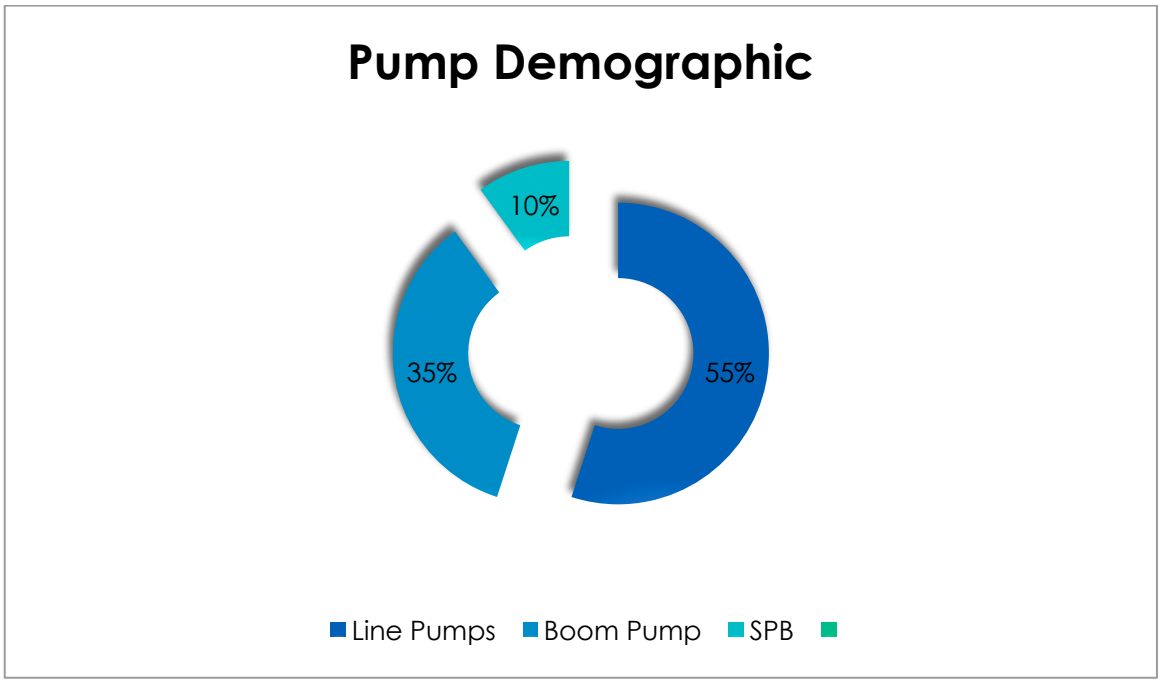
SECTION 4

7.0 - INSPECTION AND MAINTENANCE

General

The owner shall ensure that all new, used, altered, and/or repaired concrete pumps are inspected in accordance with the original equipment manufacturer's specifications and the applicable statutory requirement.

If an inspection reveals a condition determined to be hazardous, the concrete pump and placing boom shall be taken out of service until repairs are made.



CYCLE – **MOBILE, SPB & LINE PUMP** ***[COLOUR-CODE/KEY TO 3 TYPES OF CPE]***

THESE IMAGES ABOVE RELATE TO THE DESIGNATION OF CONCRETE PUMPING EQUIPMENT. TO BE COLOUR CODED ALONG RHS COLUMN.

SUMMARY OF INSPECTION INTERVALS

SPINE TO 4 COLOUR CATEGORIES BELOW

	PRE-OPERATIONAL		ROUTINE	ANNUAL	SPECIFIED
DESCRIPTION	**DAILY** (Pre-Operational)	**WEEKLY**	**MONTHLY**	**YEARLY** (every 365 days)	***SPECIFIED***
Mobile Concrete Boom Pump**	✓	✓	✓	✓	*
Separate Placing Boom**	✓	✓	✓	✓	*
Line Pump**	✓	✗	✓	✗	✗

✓ means it is **required** ✗ means it is **NOT required**

* Ad-hoc inspection or maintenance *(if and when required by the competent person)*

** Daily refers to everyday the equipment is to be used *(this does not apply when the equipment is not in use)*

Machines of up to and including 5 years old:
Inspect after every 1,000 operating hours or 1 year, whichever is soonest. The interval is repeated after every retest.

Machines more than 5 years old:
Inspect after every 500 operating hours or 1 year, whichever is soonest. The interval is repeated after every retest.

Machines more than 10 years old:
Inspect after every 250 operating hours or 1 year, whichever is soonest. The interval is repeated after every retest.

7.1 – DAILY / WEEKLY (Pre-operational)

7.1.1 Pre-operational inspections

Pre-operational inspections are required to be carried out by a competent person before use at each working period.

The concrete placing equipment needs to be checked for operational integrity and any physical damage that has occurred since the previous pre-operational inspection needs to be assessed, to determine whether it affects the operational integrity of the unit.

Pre-operational inspection of concrete placing equipment, where applicable, should include but not be limited to the following:

(a) Operating and emergency controls;
(b) Slew brakes;
(c) Safety switches and interlocks;
(d) Structure;
(e) Placards, decals, warnings and control markings;
(f) Operating manuals;
(g) Outriggers/stabilizers;
(h) Access provisions;
(i) Guarding;
(j) Pipelines (including clamps and retainers);
(k) Items specified by the manufacturer;

Insert and coordinate manufacturer breakdown checklist

Insert and coordinate truck/vehicle checks (tyre pressures, indicators, brakes etc)

MAINTENANCE SCHEDULE

GENERAL	Daily	Weekly
TASK		
Technical safety inspection by competent person, intervals according to time, operating hours or m3 concrete pumped, whichever occurs first		
Visual and functional test by machine operators	1	
Check hydraulic oil levels (before every commissioning)	1	
Drain condensation from the hydraulic oil reservoir		3
Clean cooling vanes of the hydraulic oil cooler, as well as those of the radiator		3
Check operating pressures	1	
Check the filling level of reservoirs	1	
Check the drive lines of the pump drive + grease (normal operation)		1
Check the drive lines of the pump drive + grease (heavy operation)	1	2

PLACING BOOM	Daily	Weekly
TASK		
Check fixing and condition of the end hose	1	
Grease rolling bearings of the rotary connection		2
Check the functioning of the slewing gear brake	1	

CONCRETE PUMP	Daily	Weekly
TASK		
Flush water box	3	
Check water box for deposits, clean as required		3
Grease grease nipple on rock valve, slewing cylender, agitator and filling-in hopper	2	
Check clamping screws of the rock valve swivel head for tightness		1
Check screws of the rock valve cover for tighness		1
Check axial play of the rock valve slewing shaft		1
Check cutting ring of the rock valve		1
Check pressure accumulator (only for MPS)		1

SUPPLEMENTARY EQUIPMENT	Daily	Weekly
TASK		
Check grease supply and function of the central greasing system	1	
Clean the suctionfilter of the high pressure cleaning system	3	

ROTARY COMPRESSOR	Daily	Weekly
TASK		
Check oil level (before every commissioning)	1	

1 - CHECK
2 - LUBRICATE
3 - CLEAN
4 - CHANGE

Suggested Pre-operational Inspections Checklist

7.2 – MONTHLY (Routine)

7.2.1 Routine inspections

Routine inspections are to be performed by a competent person, at least once a month and the results recorded into the logbook. The inspection shall include inspection of the equipment while it is operating and whilst it is not operating. The competent person shall determine whether any conditions found during the inspection constitute a hazard and whether a more detailed (specified) inspection by a competent person is required.

7.2.2

A routine inspection of the machine shall cover at a minimum the following, as applicable:

(a) proper operation of safety devices (e.g., holding valves, guards, and interlocks);

(b) proper operation and engagement of controls;

(c) proper operation and engagement of boom and outrigger hooks, straps, and latches;

(d) hydraulic hoses: wear, rubbing, and cracking;

(e) hydraulic oil level and leakage;

(f) proper operation of remote control boxes and cables, including a check for exposed wires, broken controls, missing control guards, and broken plugs;

(g) damage to boom and outrigger structures, including visible deformation and cracking;

(h) damage to boom and outrigger pins, including visible wear and missing hardware;

(i) tires: sufficient tread, proper inflation, sufficient tightness of lug nuts, and presence of cuts;

(j) accessories: proper loading to prevent loss while the equipment is travelling; and

(k) proper lubrication of moving parts.

7.2.3

A routine inspection of the delivery system components shall cover at a minimum the following:

(a) boom delivery system:

(i) minimum wall thickness for withstanding maximum material pressure (inspection to be conducted in accordance with the manufacturer's instructions);

(ii) dents and cracks;

(iii) missing locking pins; and

(iv) leaky gaskets;

(b) delivery system hoses:

(i) internal wear (inspection to be conducted in accordance with the manufacturer's instructions);

(ii) separation of the ferrule from the hose;

(iii) bulges, kinks, soft spots, cuts, or abraded areas (as signs of possible broken or misplaced reinforcement); and

(iv) presence of hardened concrete;

(c) couplings:

(i) cracked, broken, distorted, or missing components;

(ii) proper operation of the adjusting nut (if there is one);

(iii) concrete build up interfering with proper operation; and

(iv) system compatibility;

(d) separately laid pipeline components:

(i) minimum wall thickness for withstanding the maximum material pressure of the material placement system (inspection to be conducted in accordance with the manufacturer's instructions);

(ii) dents, holes, and deformed ends; and

(iii) old concrete inside the pipeline;

(e) cables or slings used to secure hanging system components; and

(f) missing or damaged safety signs and operational labels.

At the successful conclusion of the annual inspection the concrete placing equipment can be returned to operational service.

A dated statement by the competent person authorizing this must appear in the logbook.

MAINTENANCE SCHEDULE

GENERAL	Monthly
TASK	
Technical safety inspection by competant person. Intervals according to time, operating hours or m3 concrete pumped, whichever occurs first	
Grease joints of the operating levers	2
Check that hydraulic and water systems do not leak, check aggregates, reservoirs, pumping lines, battery, drive lines, etc.	1
Check the fixing of the base frame, support (outriggers) pumping lines, reservoirs, aggregates, BP battery, drive lines, etc.	1
Check the drive lines of the pump drive + grease (normal operation)	2
Check the oil level of the pump distributor or distributor gearbox (if present)	4

PLACING BOOM	Monthly
TASK	
Grease the grease nipples on the boom and support (outriggers)	2
Check the oil level of the slewing gear	1
Change slewing gear oil	4
Grease the toothing of the rotary drive	2
Check the fixing of the drive pinion and the rotary connection	1

CONCRETE PUMP	Monthly
TASK	
Check fixing of pumping pistons	1
Check pressure accumulator (only for MPS)	1

ROTARY COMPRESSOR	Monthly
TASK	
Change oil	4
Rebew oil filter	4
Renew oil return valve	4
Clean/renew air suction filter	3
Clean oil cooler	3

1 - CHECK
2 - LUBRICATE
3 - CLEAN
4 - CHANGE

Suggested Monthly Inspections Checklist

7.3 – ANNUAL (Yearly – 365 days)

7.3.1 Annual Inspections

Annual inspections of the placing boom and structural support system in accordance with Clauses 7.3.2 and 7.3.3 must be performed by a competent person as follows:

7.3.2

A visual weld inspection shall be performed and documented in accordance with:

- the manufacturers recommendations, or
- a competent persons recommendations (if no manufacturers directions exist)

The competent person must inspect:

(a) the placing boom and structural support system for corrosion, cracking, deformation, or damage; and

(b) measured boom pin wear.

7.3.3

Annual inspections must include an inspection by a competent person covering all of the items specified in Clauses 7.2.2 and 7.2.3 as well as the following, as applicable:

(a) measured gear lash and bearing clearances;

(b) loose or missing fasteners, including pins or pin retainers (a loose turntable bolt shall be replaced along with the two bolts on either side of it unless otherwise specified by the manufacturer);

(c) slewing and telescope bearings, gear drives, and gears for mounting and wear;

(d) hydraulic component mounting(s);

(e) missing or loose mounting bolts for the carrier chassis;

(f) cracks, deformation, or other damage to the truck mounting;

(g) hydraulic and pneumatic pumps and motors:

(i) loose bolts or fasteners;

(ii) leaks at joints between sections;

(iii) shaft seal leaks;

(iv) unusual noises or vibration;

(v) loss of operating speed;

(vi) excessive heating of the fluid; and

(vii) loss of pressure.

(h) hydraulic and pneumatic valves:

(i) cracks in the valve housing;

(ii) improper return of spool to neutral position;

(iii) leaks at spools or joints;

(iv) sticking spools;

(v) failure of relief valves to attain correct pressure setting; and

(vi) relief valve pressures (to be checked as specified by the manufacturer);

(i) hydraulic and pneumatic cylinders:

(i) drifting caused by fluid leaking across the piston;

(ii) rod seals leakage;

(iii) leaks at welded joints;

(iv) scored, nicked, or dented cylinder rods;

(v) dented case (barrel); and

(vi) loose or deformed rod eyes or connecting joints;

(j) presence of legible operational labels and safety signs attached in the appropriate places; and

(k) concrete pump components (to be inspected as recommended by the manufacturer).

At the successful conclusion of the annual inspection the concrete placing equipment can be returned to operational service.

A dated statement by the competent person authorizing this must appear in the logbook.

MAINTENANCE SCHEDULE

GENERAL	Annually
TASK	
Change hydraulic oil (oil change possible every 2 years after oil examination)	4

CONCRETE PUMP	Annually
TASK	
Check seal of the rock valve slewing shaft	1
Technical safety inspection of the pressure accumulator (only for MPS)	1

SUPPLEMENTARY EQUIPMENT	Annually
TASK	
Change the ultra-fine filter insert (special equipment) according to the maitenance indicator, in any case at least yearly	4

ROTARY COMPRESSOR	Annually
TASK	
Check oil level (before every commissioning)	
Change oil	4
Rebew oil filter	4
Renew oil return valve	4

1 - CHECK
2 - LUBRICATE
3 - CLEAN
4 - CHANGE

Suggested Annual Inspections Checklist

7.4 – SPECIFIED (Ad Hoc)

7.4.1 Specified inspections

Specified inspections are intended to be carried out at irregular or unscheduled intervals as determined by a competent person. This inspection will take into account the age of the concrete placing equipment and observations made during any inspection, which may require further investigation, or careful observation.

At the successful conclusion of the specified inspection the concrete placing equipment can be returned to operational service.

A dated statement by the competent person authorizing this must appear in the logbook.

Note: Service life durations are directly related to the increased probability of service damage, this means that the older the machine, the more likely it is to be prone to damage and require repairs.

7.5 Assessment for service / Post-maintenance testing

Before being returned to service after maintenance is performed, an altered, replaced, or repaired component shall be tested for proper operation in accordance with the manufacturer's recommendation.

7.6 Inspection report

If repairs/replacements are required (as assessed in accordance with the manufacturer's recommendations and/or the requirements of *AS 2550.15*), then the plant owner should ensure that a record of the repair/replacement action required, together with the reason, is recorded in the logbook.

7.7 Welding and other repairs

Only a welder or service provider holding the appropriate qualifications, and where possible in possession of the manufacturer's current specifications may perform welding or repair work on the concrete pump or any associated equipment (including the placing boom, the outrigger system or any other stressed structural component that is related to the overall equipment stability or structural integrity).

7.8 Reporting defects

(a) A pump operator should report defects immediately.

(b) If a defect is considered to be a hazard to safety, pumping operations should be stopped until the defect is repaired.

(c) The details of reported defects and subsequent action taken should be entered into a logbook.

7.9 Log books and inspection records

(a) Instruction manuals should accompany the pump unit and/or boom, which give sufficient instructions for operation, maintenance and repairs.

(b) Maintenance and repair manuals are to be kept in a safe place at the registered premises, and should include a parts catalogue.

(c) The operator should be familiar with the contents of the instruction manual which should be available at the site of operation.

(d) All manuals should be kept up-to-date with any additional information from the manufacturer.

(e) Maintenance log books are to be kept up-to-date, on the pump, and be available on request at the workplace.

(f) All log books and inspection records are to show complete details of all inspections, tests, repairs, replacements and modifications carried out on equipment, in accordance with *AS 2550.15*.

(g) Evidence that the pump and associated equipment has been inspected and certified as 'suitable for continued service' (i.e. in a safe working condition), should accompany the unit, and be made available to the principal contractor or person in control of the workplace for inspection (on request), before the unit is allowed to operate on site.

(h) Similarly, up-to-date logbooks & inspection records should accompany the unit and also be available for inspection by the principal contractor or person in control of the workplace.

7.10 Warning and safety signs

Ensure that all warning and safety signs/stickers are in good condition, legible and positioned on all equipment (after being inspected and found to be serviceable), in accordance with the manufacturers requirements and *AS 2550.15*.

7.11 Pipe testing, identification and marking

(a) Pipe wall thickness should be tested in accordance with the pipe manufacturer's requirements and *AS 2550.15*;

(b) Ultrasonic testing may not be appropriate for a twin wall pipeline. Other suitable testing methods should be adopted such as the use of thickness testing calipers, increased inspection and increased monitoring of use, in terms of volume and type of concrete pumped;

(c) Piping with a wall thickness less than the recommended thickness for the pumping design pressure should not be used;

(d) All pipeline segments should be clearly identified with a permanently fixed unique identification mark or number, prior to being placed in service, showing the details required in accordance with *AS 1418.15;*

(e) The pipe log book shall record wall thickness and pressure details, in accordance with *AS 1418.15*.

SECTION 5

8.0 - ASSOCIATED CONCRETE PUMPING EQUIPMENT AND OPERATIONS

8.1 PIPLINES

Insert Narrative + Images

Risk

Concrete pipeline failure.

Control

When installing a pipeline, ensure that:

(a) unnecessary bends are avoided,

(b) horizontal pipelines are adequately supported,

(c) flexible hoses are not at risk of being run over by other plant and equipment being operated in the area

(d) each section of pipe in a vertical pipeline is supported to avoid extra load on the pipe clamp, in accordance with *AS 2550.15*

(e) the 90° bend at the base altering the direction of the concrete line from horizontal to vertical is equipped with a leg sitting firmly on the ground sufficient to stop any movement in the vertical line which may snap off the first clamp

(f) vertical lines are positively secured to the building

(g) cranes or hoist towers, scaffolding or formwork are not to be used to secure the line, as this method may not be capable of taking the impact load when pumping concrete through the line, and

(h) all metal pipes and pipeline components are identified and checked in accordance with *AS 2550.15*.

8.2 HOSES

Insert Narrative + Images

8.3 CLAMPS

Insert Narrative + Images

8.4 WASHOUT TRAYS, BINS

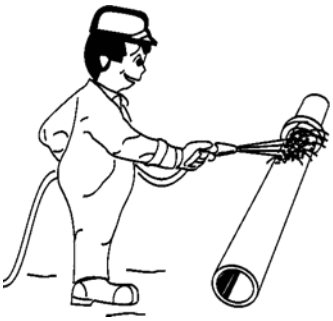
Insert Narrative + Images

8.5 CLEANING

General

You must clean and drain the delivery line, pump and hopper completely. Residual concrete in the hopper, in particular, may be flung out whilst the truck is moving.

The machine must not be driven with the placing boom unfolded or the support legs extended, even over short distances. This rule also applies when you have to drive the machine to a different site for cleaning. The placing boom and support legs must be fully retracted and secured.



The preferred methods for cleaning the delivery line are reverse pumping or forced cleaning with water. The agitator must be switched on during reverse pumping. Otherwise, the concrete flowing back into the hopper can bend the agitator shaft. Use a catch basket; pipe cleaning head and wash–out ball for forced cleaning to prevent any water from flowing into the formwork.

Never spray remote controls or control cabinets with barrier agents (mould oil or similar) to protect them against contamination. This causes significant corrosion damage to the electrical system.

8.5.1 Cleaning agents

Take care when using aggressive cleaning agents. Aggressive cleaning agents may attack

materials (e.g. rubber) and painted surfaces. You can use commercially available paint cleaning and care agents, as long as these have a pH value of between 4 and 9. Ask the manufacturer of the cleaning agent to confirm its suitability. Observe the manufacturer's instructions regarding use and safe handling. Wear protective clothing. Always rinse off cleaning agent thoroughly with clean water; do not allow puddles to form.

Do not use seawater or other water containing salt for cleaning purposes.

Do not use any highly flammable agent for cleaning, as there is a danger of fire.

8.5.2 Hazards

There is a risk of injury at all points on the machine from slipping, tripping, bumping into things, etc. Use the handles and steps to climb into and out of the machine. It is prohibited to stand on the grille. Do not jump from the machine.

Do not reach into the hopper or any other moving machine components. This rule must also be followed when you are opening the outlet on the bottom of the hopper. Do not remove the grille.

Only point the water jet into the hopper or other moving machine components. Do not insert the hose. It could become entangled with moving machine components.

8.5.3 Cleaning with compressed air

When the delivery line is being cleaned with compressed air, there is an increased risk of accident from explosively escaping com- pressed air, spurting concrete and flapping delivery or end hoses if they have not been removed.

Compressed air should only be used for cleaning purposes under the supervision of a subject expert. All persons participating in the cleaning procedure must be instructed in the safety regulations.

The manufacturer accepts no liability for damage caused by incorrectly performed compressed air cleaning. If you blow out the delivery line with compressed air, you must observe the following rules without fail:

- Individual pipes and short pipe runs up to 10 m in length must not be blown through with compressed air. There is a risk of accident from rebound.
- Only blow out delivery lines which have the same nominal diameter throughout their length. Reducer pipes must be drained and flushed out by hand.
- No bends, delivery or end hoses may be fitted at the end of the delivery line.
- A catch basket must be fastened at the end of the delivery line and a wash–out adaptor must be fitted on the head of the delivery line. Catch basket and wash–out adaptor must fit the delivery line system.
- The concrete must be able to flow freely from the end of the delivery line.
- No persons may be present in an area of 3m around the delivery line, at the end of the delivery line and especially in front of the opening in the catch basket.
- Care must be taken to ensure that any concrete that might be expelled from the catch basket cannot injure anybody or cause any damage.
- The wash–out adaptor must be fitted with a separate, large dump cock and a pressure gauge.
- The pressure gauge must be kept under constant observation during the cleaning process. The pressure in the delivery line must be rapidly dumped via the dump cock in the event of a sudden drop in pressure (concrete column exiting from the end of the line) or increase in pressure (risk of blockage).
- The sponge ball or the plug used to push the concrete out must be sufficiently dense that the air does not pass through it into the concrete. In addition, the delivery line must be sealed to the rear when the sponge ball or plug is caught in the catch basket.
- Only work on the delivery line (e.g. open the delivery line) once this has been depressurized. Make sure that the compressed air has been dumped completely.
- The dump cock must be opened in such a way that no–one can be injured by concrete residue that might be expelled from the dump cock.

8.5.4 Protection against water

Water spraying on the machine from random directions has no damaging effect. The electrical system is protected against spray water, but is not waterproof.

8.5.5 Post–cleaning procedure

You must close/seal all openings into which water/steam/cleaning agent must not penetrate for safety or functional reasons before cleaning the machine with water or a steam jet (high–pressure cleaner) or other cleaning agents. Electric motors and control cabinets are particularly at risk. After the machine is cleaned, the covers/tapes must be completely removed and the machine must be checked to ensure that it is ready for operation (*refer 7.1.1 pre-operational inspections*).

Look out for leaks, loose connections, chafe marks and damage during the cleaning procedure. Any identified defects must be rectified immediately. The machine must be greased after it has been cleaned using a high–pressure cleaner.

9.0 - SELECTION AND TRAINING OF WORKERS

TRAINING AND SUPERVISION

The overall object of the Act is to prevent a person's death, injury or illness being caused by a workplace, by a relevant workplace area, by work activities, or by plant or substances for use at a workplace.

PCBUs have duties under the Act, which include providing information, instruction, training and supervision to workers and others at a workplace. These duties ensure workers perform their work in a manner that is safe and without risk to health.

Information, training, and instruction should cover at least:

(a) the work methods to be used in the setting up and safe operation of concrete placing booms and pumps

(b) the method for inspection and maintenance of concrete pumping equipment

(c) a knowledge of the manufacturer's operation and service manuals

(d) the correct use, care and storage of personal protective equipment

(e) the correct use, care and storage of tools and equipment to be used, including electrical safety practices, and

(f) procedures to be adopted in the event of accident or injury.

Supervisors must:

(a) ensure that only those workers who have received training and suitable instruction are authorize to carry out that work, and

(b) include sufficient monitoring of the work to ensure that agreed safe work practices are being adhered to, including the use of all protection systems and personal protection equipment.

CHECKLIST

MINIMUM REQUIRED EXPERIENCE FOR CONCRETE PUMP / BOOM OPERATORS

TYPE OF PUMP/BOOM	TIME REQUIRED
Grout & Pea Rock	3 Months
Line Pump - General	6 Months
Line Pump - High Pressure	12 Months
Up to 3 Section Boom	12 Months
4 or more Section Boom	12 Months
50-Meter and Larger Boom	18 Months
Separate Placing Boom	6 Months

SECTION 6

10.0 - SPECIAL WORKS

10.1 REQUIREMENTS FOR SPECIAL WORK

In the capacity of operator, it is your responsibility to provide all the necessary information to the personnel concerned before special work or maintenance work is carried out. Someone should be nominated as the person responsible for this.

Carry out the maintenance and inspection operations and comply with intervals specified in the Operating Instructions, including specifications for the replacement of parts and equipment. These activities must be carried out by qualified personnel only.

Workshop equipment appropriate to the task in hand is absolutely necessary for the execution of maintenance work.

Secure a wide area around the maintenance area as far as is necessary.

A machine completely shut down for maintenance and repair work must be secured against being restarted inadvertently:

1. Lock the main control devices and remove the key.
2. Fix a warning plate to the main switch.

Only carry out maintenance work if the machine is parked on level and sufficiently supporting ground and is secured against rolling away.

Use specially designed or otherwise safety–oriented climbing aids and working platforms when carrying out assembly work above head height. Never use machine parts as climbing aids. Keep all handgrips, steps, railings, platforms and ladders free from dirt, snow and ice.

Carefully secure individual parts and large assemblies to lifting gear when carrying out a replacement operation. Use only suitable and technically perfect lifting gear and suspension systems with adequate lifting capacity. Never stand under suspended loads.

The fastening of loads and instruction of crane operators should be entrusted to experienced persons only. The signaler must be within visual range of or in voice contact with the crane operator.

Observe national regulations when working with lifting gear.

Work on chassis, braking and steering systems must only be carried out by qualified personnel trained for such work.

Clean the machine, especially connections and threaded unions, of any traces of oil, fuel or preservatives before carrying out maintenance or repair work. Do not use aggressive cleaning agents. Use lint–free cleaning rags.

Bolted connections that you have loosened for carrying out maintenance and repair work must always be retightened to the specified torque.

Do not open gas–filled spring elements, as used on maintenance flaps, for instance. The spring elements are filled with gas under high pressure, which can escape explosively if you attempt to open them. Relieve the tension on systems under mechanical stress.

Be aware of hot functional fluids and surfaces (hydraulic fluid, hydraulic fluid radiator, etc.).

Ensure that all functional fluids, consumables and replaced parts are disposed of safely and with minimum environmental impact.

10.2 WELDING

Only qualified personnel commissioned by the manufacturer may carry out welding work on the placing boom, on the supports or on other components, which are important for safe operation. A competent person must inspect the work.

Always attach the earth cable of the welding unit directly to the component, which is being welded. The welding current must not flow through hinges, cylinders, etc. Significant damage may be caused by current bridging gaps.

Electronic components can be destroyed by stray voltage during arc welding processes. For this reason:

. – Disconnect the remote control cable from the control console.

. – Disconnect all cables leading to the receiver of the radio remote control system.

. – Close connector sockets with caps.

. – Disconnect the positive and negative leads from the battery. Only carry out welding, flame cutting and grinding operations on the machine if this is expressly approved by the manufacturer. Clean the machine and its surroundings of dust and flammable substances and make sure that the premises are adequately ventilated before carrying out welding, flame-cutting and grinding operations (danger of explosion). Only qualified personnel should carry out welding work on the fuel and oil reservoirs in accordance with the manufacturer's specifications.

10.3 WORKING ON THE PLACING BOOM

Only carry out maintenance and repair work on the placing boom if the placing boom is folded or properly supported, the engine is switched off and the support legs are secured.

Support the placing boom arms before starting work on the valves, cylinders or hydraulic lines on the boom.

The delivery line was installed without tension with the placing boom in the driving position and can only be replaced without difficulty in this condition. Stresses may be generated on folding if the delivery line is replaced when the placing boom is unfolded.

Do not remove the whole delivery line but exchange the delivery arm, eg- boom arm by boom arm. Otherwise, the pivot points of the new delivery line will have to be re-determined using special equipment.

Following substantial changes, placing booms must be inspected by an competent person before recommissioning.

10.4 SAFETY-RELEVANT COMPONENTS

Some of the manufacturer's spare parts, such as pumps, valves and controller cards are supplied from the works with a basic set- ting. These must be adjusted (set) in accordance with the information on the circuit diagram or machine card after installation in the machine.

Parts relevant to safety and adjustable devices (pressure limiting valve, potentiometer, fluid flow limiter, hydraulic cylinders, etc.) must only be repaired, replaced or adjusted by After Sales Service personnel. Seals must only be removed by the manufacturer's After Sales Service personnel. Modifications to the machine ratings (for example, increasing pressures, modifying speeds, etc.) are not permitted.

10.5 SOFTWARE

If a machine is equipped with software, the software may only be used as is provided for in the manufacturer's Operating Instructions.

Only persons authorized by the manufacturer may intervene in the machine's software. This also applies to updates.

Unauthorized interventions in the machine's software may lead to severe damage and accidents.

10.6 PROTECTIVE AND SAFETY EQUIPMENT

Any safety devices removed for maintenance purposes must be refitted and checked immediately upon completion of this work.

All equipment required for safety and accident prevention (warning signs and information plates, grilles, guards, etc.) must be in place. Such equipment must not be removed, modified or damaged.

Keep all warning signs and information plates on the machine complete and in a perfectly legible condition.

It is your responsibility as operator to ensure that any warning signs and information plates that have been damaged or rendered illegible are replaced without delay.

SECTION 7

11.0 – CHECKLISTS and TEMPLATES