



Concrete Pump Delivery Industry Guidelines



Cement Concrete & Aggregates Australia (CCAA) is the peak body representing the \$7 billion a year cement, concrete and aggregate industries.

CCAA represents the interests of its members to governments and the wider community on issues as diverse as resource access and security, transport, workplace health and safety, and the environment.

Acknowledged nationally and internationally as Australia's foremost cement, concrete and aggregate information body, CCAA takes a leading role in education and training, research and development, technical information and advisory services and is a significant contributor to the preparation of Codes and Standards affecting building and building materials.

CCAA aims to protect and extend the uses of cement, concrete and aggregate by advancing knowledge, skill and professionalism in Australian concrete construction and by promoting awareness of products, their energy-efficiency properties and uses, and of the contribution the industry makes towards a better environment.

CCAA is a not-for-profit organisation.

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Section 1 Introduction

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 regulations¹ (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.

1.1

How is the Industry Standard Organised

In providing guidance, the word 'should' is used in this Industry Standard to indicate a recommended course of action, while 'may' is used to indicate an optional course of action.

The Standard also includes various references to provisions that may be provided in jurisdictional WH&S legislation and regulations, which may outline legal requirements. The words 'must', 'requires' or 'mandatory' indicate 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.

1.2 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.

¹Please refer to Appendix 1 for a list of each State and Territories work health and safety authorities and their contact details. Further information on their work health and safety legislation and regulations are available from their websites.

1.3 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.

1.4 Consulting, 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.

1.5 Training and Supervision

The overall objective of WH&S legislation is to provide for the health, safety and welfare of persons at work.

Anyone who conducts a business or undertaking, including PCBUs, has obligations under WH&S legislation, which includes providing information, instruction, training and supervision to workers and others at a workplace. These obligations ensure that workers perform their work in a manner that is safe and without risk to their health.

Information, training, and instruction should at least cover:

- a) The work methods to be used in the setting up and safe operation of concrete placing booms and pumps.
- b) The method of 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.
- f) Procedures to be adopted in the event of accident or injury.

Supervision must:

- a) Ensure that only those workers who have received adequate training and instruction are authorised to carry out that work.
- 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.



Section 2 Risk Management

The risks from concrete pumping, like any other risks, are best controlled using a risk management approach. The objective of risk management is to enable people to systematically assess all the factors involved in delivering and pumping concrete safely.

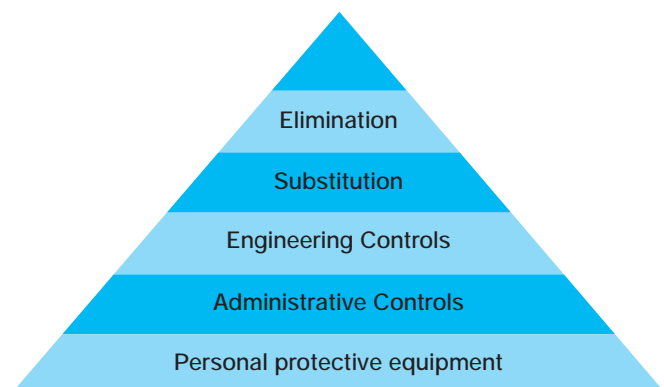
This approach will help people make a judgement about the associated risks and put in place appropriate control measures. The risk management approach involves:

- a) Identifying plant hazards that pose a risk.
- b) Assessing the degree of risk created by the plant, environment and work processes.
- c) Determining and implementing appropriate control measures.
- d) Recording the assessment and any action or work procedure established for the workplace.
- e) Monitoring and reviewing the effectiveness of the chosen control measures.
- f) Each company should undertake the above process in accordance with its own risk management policies and procedures.

2.1 Hierarchy of Control

Once risks have been identified they must be controlled to prevent harm to workers and bystanders. Risk can be controlled by deciding on one of the following mechanisms for reducing or eliminating the risk:

- a) Eliminate hazard: is the most effective means of hazard control and involves the physical removal of the hazard and risks.
- b) Substitute hazards: by removing something that produces a risk or hazard and replacing it with something that does not produce any hazards or risks.
- c) Engineering Controls: do not eliminate hazards, but rather keep people isolated from the risks and hazards.
- d) Administrative controls: involve changing the way people work and include procedures, training and signage.
- e) Personal protective equipment: is the least effective way to control hazards as it has the high potential to become ineffective through use and damage. PPE can include gloves, respirators, hard hats, safety glasses, high-visibility clothing, and safety footwear.



The Hierarchy of Controls: Apply the highest level of control commensurate with the risk. Lower level controls may be used in the interim while long-term controls are implemented.



Section 3

Risks Associated with Managing Concrete Pumping

The risks associated with managing concrete pumping are many and varied. It may be useful to list risks in terms of their originating hazard. Risk may originate from hazards such as:

i Plant and equipment, including:

- Concrete placement booms
- Pump gauges
- Pipes
- Pipe clamps and safety pins
- Anchor brackets
- Pipeline failure
- Excessive pipe movement
- Pipe movement
- Delivery hose
- Receiving hopper
- Outriggers

ii Placement of plant and equipment, proximity to:

- Traffic
- Members of the public
- Powerlines
- Trenches
- Ground stability
- Outriggers

- Other pumps and concrete delivery trucks
- Workers
- Pump operator
- Concrete delivery truck driver

iii Tasks, including:

- Pump and boom operation
- Concrete pouring
- Line cleaning
- Pump cleaning
- Road travel
- Reversing trucks
- Operating other plant

iv By-products, including:

- Fumes
- Noise
- Manual handling
- Cement

This document discusses all of the risks listed above, as well as appropriate control measures.



Section 4

Planning and Preparation: Pre-Pour

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.

4.1

Planning by the Principal Contractor or Person in Control of the Workplace

When planning for the pumping of concrete the principal contractor or person in control of the workplace should consult with the pump operator regarding the risks. The Principal contractor, or the person in control of the workplace, should hold a pre-pour meeting with all workers involved with the pour to ensure the following:

- a) A safe and legal entry to the site.
- b) A safe route to the pump (including adequate signage).
- c) A spotter (traffic controller) is required when reversing and to assist in conditions involving reversing in low light, low clearance, obstacles, tight access or vehicle and/or pedestrian traffic.
- d) 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 (see section 6.2).
- e) There must be a clear space available that allows all work to be carried out safely. This includes a space for the pump operator, the delivery driver and the concrete tester.
- f) 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.
- g) Clear and safe access to the pump unit for concrete trucks which does not require drivers to breach road rules when reversing onto the pump.
- h) If the pump unit is set up in the street then safe and unobstructed access for the general public to public areas in the vicinity of the pumping unit and the delivery trucks must be provided.
- i) A time schedule is set prior to a major pour commencing, based on a realistic assessment of the time required to complete.
- j) An allowance is included for such things as weather, accessibility, volume of concrete, slab and site limitations, equipment back up, restricted work times (local government rules), equipment capacity, pump operator's capacity, hose-hand's limitations and the concrete supplier's requirements.
- k) A clearly designated 'pump washout area' complying with environmental protection legislation and local authority requirements must be provided before work commences.
- l) Where compressed air and water lines are supplied on site, that they are positioned to avoid any damage.
- m) There is a method to collect concrete residue and/or all necessary precautions 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.

- n) The concrete pump boom must be set up clear of overhead power lines, if this cannot be achieved then the use of a line pump is recommended.
- o) If a boom pump must be used near overhead power lines then an excess concrete dumping site should be placed clear of the electrical no-go zone before pumping starts.
- p) A safe exit from the site is provided.

Don't forget the tester

Concrete testers play a significant and integral part in the delivery of pre-mixed concrete. Their job is to ensure the concrete meets the specifications and requirements of the job and that it accords with the AS 1012 - Methods of Testing Concrete.

Concrete testing is physically demanding work that requires proper planning to ensure that it can be carried out efficiently and safely. To achieve this it is necessary to provide the following:

- Provide the tester with a safe parking space in close proximity to the location where the concrete is being discharged. This is often preferred to be at the front of the pump.
- The area provided to the tester must be even, stable, safe and clear of all construction equipment and debris.
- The stable, safe, clear and short path must be provided from where the test vehicle is parked to where the concrete is being dispatched.
- A safe location must be provided where the testing cylinders can be stored and collected.
- The concrete tester must be provided with safe access to the concrete flow for sampling purposes.
- Sampling should only occur when safe, this includes the use of appropriate guards and grills on the hopper.

- 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) Conduct a job safety analysis on any manual tasks that may cause any muscle or ligament strains or other injuries.
- f) The provision of PPE and other safety gear.
- g) The provision of safe access including elimination of trip, slip and fall hazards.
- h) A plan or map that details the safe setup of the site, including ramps, bracings and washout bins.
- i) Electrical safety, including the location of nearby powerlines and systems of work which comply with electrical safety legislation and the recommendations of any local, relevant compliance requirements.
- j) Electrical no-go zones should be clearly marked and defined prior to starting work.
- k) A concrete waste dump site should be set up prior to starting work.
- l) 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.
- m) 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.

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

- 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 reversing to the concrete pump.
- 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 reversing to the concrete pump.

NOTE: Drivers of pre-mixed concrete delivery trucks should not be considered workers for pumping operations, unless trained to carry out this function and authorised to act in this capacity by their PCBU.

4.2 Planning by the Pump Operator

The pump operator should consult with the principal contractor or person in control of the workplace in regards to the overall planning for pumping concrete on site. Following this consultation the pump operator should 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 shutdown system, in case of line failure or other events.

4.3 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 contractor 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.



A concrete delivery truck, also known as a concrete agitator



Section 5

Risk Controls for Concrete Plant and Equipment

5.1 Plant and Equipment Risk

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.

Concrete pipelines and restraint equipment

All lines, pipes, couplings and fittings must be capable of withstanding the maximum pump pressure (including during blockages) or the pump pressure must be adjusted so that it does not exceed pipeline rating.

5.2 Pipes

Risk - Concrete pipeline failure.

Risk control

When laying a pipeline, ensure that:

- Unnecessary bends are avoided.
- Horizontal pipelines are adequately supported.
- Flexible hoses are not at risk of being run over by other plant and equipment being operated in the area.
- Each section of pipe in a vertical pipeline is supported to avoid extra load on the pipe clamp, in accordance with AS 2550.15-1994 Cranes - Safe Use - Concrete Placing Equipment.
- The 90 degree 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.
- h) All metal pipes and pipeline components are identified and checked in accordance with AS 2550.15-1994 Cranes - Safe Use - Concrete Placing Equipment.
- i) No one is to stand within 10 metres of a leaking pipe or fitting when the pump is operating. Any leaking pipe or fitting should be attended to at the earliest opportunity.



A damaged concrete pipeline



Concrete pipe with safety pins

5.3 Pipe Clamps and Safety Pins

Risk - Concrete pipe clamp failure.

Risk control

The concrete agitator driver must be alert to the risks associated with delivering concrete into the hopper. When using quick release pipe clamps on fixed lines (horizontal or vertical), ensure that:

- a) The pipe clamps used are able to sustain the maximum concrete pressure applied to the pipeline by the pump.
- b) The locking and safety pins are used and are engaged.
- c) All pipe clamps are regularly inspected by a competent person for signs of wear and fatigue.
- d) Pipe clamps which show any deformation or damage are immediately replaced.
- e) Safety pins are to be fitted to all couplings and clamps.
- f) Pipe clamps that are manufactured with no provision for locking pins are not used.
- g) Clamps are locked as per the manufacturer's instructions and are not locked by hammering the quick release clamp lever, or by other methods which may cause fatigue of the clamp's metal.
- h) Safety chains are to be fitted on the slurry cap. Safety features to primary pump hopper and pipe work.

Note: When using reinforcing bars or steel pins to anchor excessive movement ensure they are driven securely into the ground. They must be capped with the appropriate reinforcing caps.



New and damaged pipe clamps



Concrete pipe clamps with safety pins

5.4 Anchor Brackets

Risk 1: Pipeline Failure

Risk control

The concrete agitator driver should assess any risks associated with excessive movement in the pipeline. When inserting anchor brackets on the concrete delivery pipe the pump operator should ensure that:

- Anchor brackets and tie-downs are used to adequately secure the system, at intervals of no more than three metres apart, unless otherwise specified by a competent person.
- The number of bolts used to secure an anchor bracket should be in accordance with AS 2550.15-1994 Cranes - Safe Use - Concrete Placing Equipment, the pump
- Where friction type 'drill-in' anchors are used, these are of the high-load slip, torque controlled type and have a factor of safety of 3 to 1 based on their failure load.
- Chemical anchors are pull out load tested to 125% of their working load and have a factor of safety of 3 to 1 based on their failure load.
- When securing pipes overhead (i.e. so that the bracket anchors are loaded in pure tension), 'through bolts' that extend through the concrete slab are preferable to drill-in type anchors. If drill-in type anchors are used in this application they should all be pull out load tested to 125% of their working load.

Risk 2: Excessive Pipeline Movement.

Risk control

Where excessive pipe movement occurs in temporary laid lines due to the surging action of the pump, to:

- Use extra anchorage methods to restrict the line movement, especially at bends and elbows

Or

- Install a short wire-braided high pressure rubber hose between the concrete pump and pipelines in accordance with the manufacturer's recommendations.

When using concrete pumps and kibles it is important that:

All safety features are fitted and are in working order on the concrete pump as required by state safety regulations. These include but are not limited to:

- A secure hopper grate.
- Emergency stop devices within easy reach of the driver.
- Safety chains on the slurry cap.
- Safety pins in all couplings.
- Earth straps when near power lines (in accordance with AS 2550.15-1994 Cranes - Safe Use - Concrete Placing Equipment).
- Boom pump certification on display.
- Log books available for inspection.
- All safety features are fitted to kibles.
- A certified crane operator and dogman (if required) is employed.

5.5 Placement of Plant and Equipment

Setting-up the Site

Risk

There are numerous risks associated with the setting-up of concrete placing equipment, including concrete pumping booms tipping over, due to ground stability, inclination and short rigging. This puts the workers at risk of being crushed or run over by the concrete pump or by the concrete truck.

Consultation regarding the risks involved with the set-up of concrete placing equipment should occur between the principal contractor or person in control of the workplace and the pump operator.

Risk control

When setting-up a concrete pump the area should be level, capable of supporting the load and free of obstructions. Calculations of bearing pressure should be provided by the pump operator when required. Careful attention should be paid to the following:

- a) The concrete pumping area should be level and clear of building debris, materials or other slip/trip hazards in order to provide a safe area for workers to stand when operational.
- b) There is a stable ground surface - uncompacted fill can present a rollover hazard for heavy trucks, rain on a clay surface can create very hazardous (slippery) conditions.
- c) The discharge area and the approach for the concrete delivery truck also must be clear and stable.
- d) Particular care and precautions should be taken when a concrete pump is used in the vicinity of an excavation, as the weight of the concrete pump and the load can affect the stability of the excavation wall and cause it to collapse, which may lead to the concrete pump overturning. The pump should not be positioned over or adjacent to:
 - i) Previously disturbed ground that has been backfilled.
 - ii) Excavations, trenches or holes in the ground.
 - iii) Cellars, basements or pits.
 - iv) Inadequately compacted or soft ground.
- e) The maximum inclination of the concrete boom is three degrees.
- f) If the ground is not firm or is near an excavation, the operator should immediately refer the matter to the principal contractor for re-location to a more stable location.
- g) That the pump unit is set up level, and if this cannot be achieved ensure that the incline or angle of the machine does not exceed the manufacturer's recommendations (refer to operating instruction manual).
- h) Particular care must be taken when spraying diesel onto the hopper and using plastic and timber bunds to avoid trips, slips and falls.
- i) Positioning outriggers:
 - i) Supply adequate sole plates for the purpose of packing the base plate.
 - ii) Ensure the outrigger's pads are clear of excavations, soft or filled ground, or other obstacles liable to interfere with the safe operation of the machine.
 - iii) Ensure that the sole plate material, if timber, is 'pigstyed' and is of sufficient bearing area to support the machine.
 - iv) Ensure the outriggers do not subside, by making regular checks to ensure stability.
- j) Wherever possible outriggers should be fully extended and short-legging should only be performed in accordance to the manufacturer's specifications.
- k) Adequate counter weights, where fitted, should be maintained at all times.

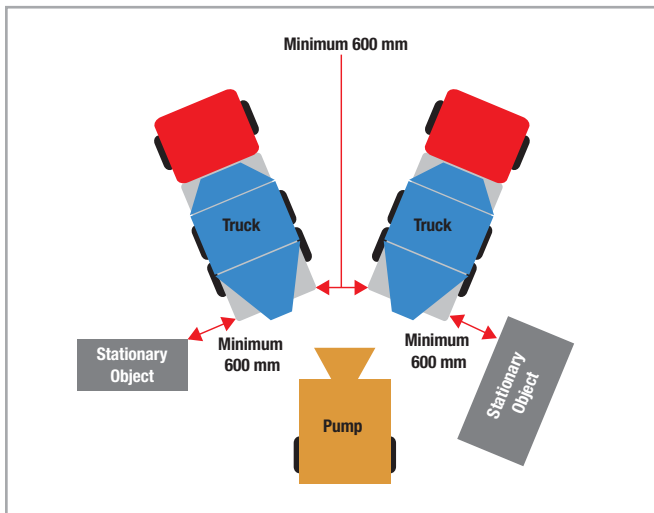


A concrete pump truck with its outriggers extended and pigstyed.

- l) Unauthorised persons should be kept away from the machine and associated equipment with signage clearly stating that the area is for authorised persons only, for example 'Danger - Concrete Pumping Area - Authorised Persons Only'.
 - m) Persons working in the operational safety zone must wear appropriate PPE, including:
 - i) Safety helmet
 - ii) Eye protection
 - iii) Hearing protection
 - iv) High visibility vest or shirt
 - v) Long sleeves and pants
 - vi) Work gloves
 - vii) Sun protection, such as wide brim hat and sunscreen
 - viii) Appropriate safety boots.
 - n) Concrete delivery trucks must not break the road rules when delivering concrete.
 - o) The area should be clearly marked and made safe from other traffic.
 - p) Set-up areas should be provided with clear access and adequate lighting at all times during operation.
 - q) Where operation of the plant is required at night or in low light conditions, artificial lighting should be provided.
- In addition for a two truck feed:
- a) A spotter to assist reversing trucks must be provided by the contractor or pump operator.

- b) Provide a safe location for the spotter, pump operator and truck drivers to prevent them from being caught between the reversing truck and the pump hopper, other trucks or stationary objects. No one should ever stand between a reversing truck and the pump or other nearby stationary object.
- c) Ensure a minimum clearance of 600 mm between trucks or stationary objects as shown below.
- d) Permit only one truck at a time at the pump if any of the above cannot be achieved.

Note: drivers of premixed concrete delivery trucks should not be considered to be workers for pumping operations.



600mm clearance between two trucks simultaneously feeding into pump hopper



A truck spotter, in correct PPE, reversing a concrete agitator onto the concrete pump. Two trucks on the feed with over 600mm clearance.



Unsafe spotter without appropriate PPE and position adjusting concrete chute while truck is reversing

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 and correct 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.

5.6

Setting-up Near Powerlines or Electrical Equipment

Risk

Proximity to overhead powerlines can pose a major risk when pumping concrete. Before setting-up concrete pumping equipment in the vicinity of overhead powerlines, consultation regarding risk should occur between the principal contractor and the pump operator.

The relevant State energy authority must be contacted to identify Danger Zones and required clearances.

When setting up a concrete placing boom in the vicinity of powerlines the principal contractor and the concrete placer must ensure that during all stages of the concrete pumping operation no part of the concrete placing boom comes within the regulated distance of the powerlines. The relevant electrical authority and WH&S regulators should be contacted to obtain the safe work practices and required clearances from powerlines.

While some States may differ, it is generally regarded that a concrete placing boom cannot enter the danger zone around powerlines, as illustrated in the diagrams below:

Additionally, when setting up near aerial powerlines the following precautions must be adhered to:

- a) When operating in a new or unfamiliar area, complete a pre-setup search for any aerial powerlines.
- b) All powerlines must be considered to be live, unless there is written evidence that the powerlines are isolated and safe.
- c) Where necessary provide overhead bunting and ground barriers to warn people of the minimum safe distance, which are generally 3 metres from distribution poles and 8 metres from transmission towers. Be sure to refer to State power authority safe minimum distances.

There are also a number of devices available that either assist in preventing contact with powerlines, or reduce the degree of risk in the event of contact. Such devices include the following:

- a) The use of 'tiger tails' on powerlines act as a visual aid that assists in maintaining appropriate clearance distances by highlighting the location of the powerlines. Only low voltage lines (under 1,000 volts) can be covered with tiger tails, which leaves the higher. Voltage lines on power poles (usually at least 11,000 volts) exposed.

Note, tiger tails do not insulate the wires and therefore the 'exclusion zone' must be maintained.

- b) Limiting or warning devices to assist in preventing the pump boom from entering the 'exclusion zone'. If a limiting or warning device is used, the system should be designed to 'fail safe' or should at least meet category 4 reliability in accordance with AS 4024.1 - 2006 Series - Safety of Machinery. When earthing the concrete placing booms should be in accordance with AS 2550.15-1994 Cranes - Safe Use - Concrete Placing Equipment.



Always be aware of where overhead powerlines are located

Irrespective of whether safety devices are being used, the 'exclusion zone' must not be encroached upon. Unloading and setting-up of concrete pumping pipes also poses a risk of contact with overhead powerlines. Pipes should be kept parallel to the ground when setting-up near overhead powerlines. An observer must be used to ensure that concrete booms do not come into proximity to powerlines.

Further aspects to consider when working near powerlines are:

- a) High voltage electricity can jump across an air gap. While a concrete pump boom may not be built of conductive material, being wet or dirty may create a conductive path down a boom, through a person, to the ground. A boom does not need to contact a high voltage powerline for an electrical path to be created.
- b) Where work within the Regulation clearance distances is required, a Network Access Permit should be obtained from the relevant electrical authority for de-energisation of the powerline for the duration of such work.
- c) The Electricity (General) Regulations do not specify requirements for the earthing of concrete placing booms. When earthing the concrete placing booms should be in accordance with AS 2550.15-1994 Cranes - Safe Use - Concrete Placing Equipment.

5.7

Setting-up in a Public Place

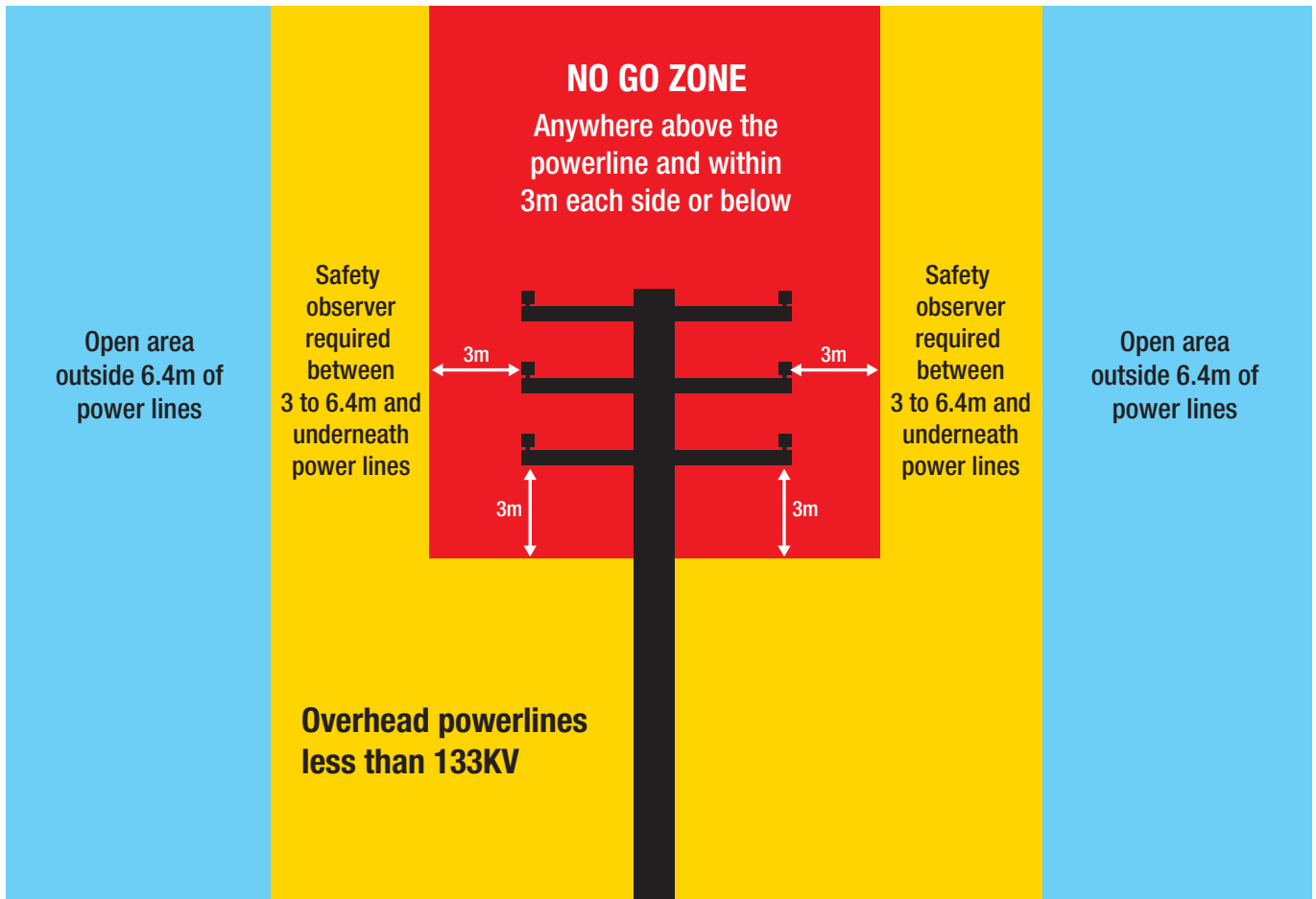
Before setting-up a concrete pump in a street, roadway or public place, consultation should take place regarding relevant risks between the principal contractor and the pump operator. If concrete pumping will take place on a public road ensure that:

- a) A safe area to pull off the road is provided.
- b) The driver does not need to breach road rules while accessing, parking or discharging the concrete truck.
- c) The driver can safely exit the cabin and operate the mixer.

- d) An 'operational safety zone' using traffic control cones is provided. Careful attention is to be given to the following:
 - i The principle contractor usually is required to obtain permits from the relevant road authority and local government to manage traffic around the site, these must be checked by the pump operator and concrete delivery drivers.
 - ii The public must be directed to an alternative footpath, and protective screens erected or fitted around the pump area to prevent concrete being splashed on the public.
 - iii Lane closures and other operations which require the erection of appropriate barricades and signs must comply with the requirements of the relevant State Transport Authority, Local Governments and any relevant Building or Local Acts.
 - iv The person in control of the relevant workplace area must provide or arrange for adequate traffic control, in consultation with the pump operator.
 - v Exclusion zones for workers onsite need to be created.



Traffic management in a public place



Stay outside the No-Go Zones of overhead powerlines



Section 6 On the Day of the Pour

6.1 Concrete Delivery

Risk

Concrete delivery involves the delivery of concrete from the delivery truck to the concrete pump hopper. In this operation one or more concrete trucks are reversed up to the concrete hopper to deliver concrete. This activity poses risks to the concrete delivery truck driver, the concrete pump operator, the allocated traffic spotter, other workers working in and around the concrete pumping operational safety zone and members of the public. The risks from this phase of delivery include:

- a) Being hit or run over by a delivery truck.
- b) Entrapment between the delivery truck and hopper or stationary objects, or between delivery trucks.
- c) Being struck by concrete whilst discharging concrete into the hopper, due to equipment failure such as a burst line or pipe.
- d) Entanglement, crushing and amputation by the concrete hopper.
- e) Being struck by ejected pipes from the concrete pump due to clamp failures, whilst discharging concrete into the hopper.

Risk control

When delivering concrete, the following must be ensured:

- a) Concrete delivery trucks should have clear and safe access to approach and leave the receiving hopper of the pump.

- b) If more than one concrete delivery truck is required to approach the receiving hopper at any one time, the person in control of the relevant workplace area should ensure that a spotter or traffic controller is on hand to safely direct the movement of the trucks, whilst considering the safety of each worker in the area.
- c) Concrete delivery trucks must not reverse into the operational safety zone if they cannot see the nominated person for directing the truck (the spotter). The vehicle should immediately stop when the driver loses sight of the nominated person directing the truck.
- d) If more than one concrete delivery truck is required to approach the receiving hopper at any one time the person in control of the relevant workplace area should ensure:
 - i) A spotter or traffic controller is on hand to safely direct the movement of the trucks.
 - ii) There is adequate room for the concrete delivery truck driver to operate the concrete truck safely and in the event of an emergency have clear access to operate the concrete pump emergency shutdown device.
- e) No person should stand between the reversing concrete delivery truck and the hopper.
- f) The primary chute on concrete trucks should only be moved when the truck is stationary. It is preferable for the truck driver to perform this task. If another worker performs this task then the permission of the driver should be obtained.

- g) The concrete receiving hopper should be at a height that allows a gravity flow of concrete into the hopper.
- h) Additional ramping may be required for the concrete delivery truck where low slump concrete is to be used. Where ramps are used they should be specifically designed to:
 - i) Ensure the truck cannot back off the ramps.
 - ii) Ensure the truck remains stable.
 - iii) Have a non-slip surface.
- i) Where concrete delivery trucks are fitted with flashing hazard lights they are to be activated when the truck is in reverse.
- j) All concrete delivery trucks should be fitted with audible reversing devices.
- k) A reversing camera is recommended to be fitted as an effective means for improving safety performance. When delivering concrete to the pump hopper the following should be ensured:
 - i) The receiving hopper of the concrete pump must be positioned so that it can receive a concrete flow readily from the discharge chute of a concrete delivery truck.
 - ii) The pump must be fitted with a secure hopper grate constructed of parallel bars. A grill must be provided to prevent access to dangerous moving parts such as feed or agitator mechanisms and valve gear.
 - iii) If the hopper grate/grill is not bolted down (i.e. can be lifted without using a tool) it must be connected to an emergency stop button/switch that is designed to isolate the agitator shaft if the grill is lifted.
 - iv) The emergency stop button must be operationally accessible.
- l) The hopper grate/grill must be constructed of parallel bars as a minimum, that are spaced so that it is not possible for a person's hand to become trapped (this spacing should not exceed 70mm).
- m) The distance from the top of the hopper grate/grill to any moving parts should be at least 150mm.
- n) Double barring a hopper grill improves safety performance. But do not put any items, such as crowbars into the hopper.
- o) To minimize injury risk from contact with a pipe or concrete under pressure due to pipe or coupling failure, the following should be considered:



Interlocking mechanism which shuts down the pump if the grate is lifted



Hopper safety grill - double bar

Use of the 5th (non-standard) chute

Hazard Identified

Industry experience is that the use of additional chutes can contribute to the failure of the chute jack arrangement.

Risk 1

Such a failure is hazardous to workers with respect to being struck, pinched or crushed and is considered serious in nature.

Risk 2

Safety regarding the manual handling of standard chute systems must be addressed.

Risk Reduction Measures

1. No additional chutes are to be added to trucks (only use those supplied on a truck by the manufacturer) DO NOT use a 5th chute.
2. Customers and contractors should not be permitted to access or operate any part of the truck or mixer.
3. When moving a truck with extended chutes a spotter must be used - and the chutes must be locked.

Ongoing Actions

- Inform people working in the vicinity of concrete chute discharge points about these risks.
- Make this an agenda item at safety meetings.

- i Ensure pipe line thickness testing is completed and maintained to the required standards.
- ii Workers must wear appropriate PPE when in the vicinity of the pump hopper and pipelines.
- iii Where possible the concrete truck driver should position themselves opposite to pump pipe work.
- iv Cover the pipe in hessian to stabilise it and to capture any unintentional discharge.

6.2 Pump and Boom Operation

Risk

Inexperienced or untrained operators pose a risk of unsafe operation.

Risk control

Concrete pump and boom operators must be competent to safely operate relevant equipment. Competency is achieved through training and supervision and should be assessed by testing both theoretical knowledge and physical operation of the machinery. It is necessary for operators to obtain a high-risk work licence from the appropriate State and Territories WH&S authority.

Pump and boom operators should:

- a) Be familiar with manufacturer's advice and information contained within manuals and other documents, including hydraulic pressure relief settings and maximum rated concrete pressure.
- b) Operate the plant in line with the advice and information of the manufacturer.
- c) Carry out the daily maintenance inspection, visual inspection of the pipeline and other pre-operational inspections in accordance with the plant operator's manual, before pumping commences.
- d) Always attend to equipment, or arrange for an alternative competent person to attend if required to work away from the equipment.
- e) Be located at the pump or, if using a remote control, have a clear view of both the hose-hand and the hopper. If unable to view both then an additional competent person, other than the delivery truck driver, should be located at the hopper and be responsible for stopping the pump.
- f) Pump concrete only when the hopper grill is in the closed position.
- g) Ensure that an emergency stop is located within easy reach of all workers.

Outriggers must be fully extended and setup as per the manufacturer's specifications prior to moving and positioning the boom and the following must be ensured:

- a) The boom is not used as a crane.
- b) The boom is not rotated over trucks or drivers.

Bad weather and strong winds

Storms, gales and cold temperatures can restrict or prevent the use of a concrete boom.

Storms and Strong Winds

In storms and strong winds it is necessary to shift the boom to the rest position, noting:

Booms with a vertical reach of 42 metres or more may operate in wind forces up to 7 (wind speed 61 km/h = 12 m/s).

Booms with a vertical reach of 42 metres or less may operate in wind forces up to 8 (wind speed 74 km/h = 21 m/s).

Cold Temperatures

- The boom must not be used if the temperature drops below 15°C, as there is the risk that the steel frame and seals could be damaged.
- Cold weather may also impact on the strength of the concrete and it is not advised that concrete be placed at these low temperatures without special additives.

- c) The delivery hose is secured by a safety chain.
- d) Only one drop hose is to be fitted to the boom.
- e) No metal fittings are to be attached to the free end of the drop hose.
- f) Pump flow rates match the discharge rates of concrete delivery trucks.
- g) Follow the directions of the hose-hand.
- h) A system of communication is maintained with the hose-hand.

Additionally all workers must ensure:

- a) To never place their hands, or any other objects, in the hopper when the pump is working.
- b) To never stand or walk on the hopper grate when the pump is operating.

6.3 Concrete Pumping

Risk

A delivery hose connected to the pump is utilised to deliver concrete to the pour area. In this operation there may be a risk of concrete lines bursting, lines becoming unrestrained and pipe clamps being dislodged. Damage to delivery hoses or the inappropriate selection of a delivery hoses may also cause the leakage of concrete under pressure.

Risk control

The pump must be maintained to manufacturer's specifications and both line hands and concreters should be careful to not stand under the concrete boom when concrete is being pumped.

- a) The rubber delivery hose must always be checked for damage prior to being fitted.
- b) Where the delivery hose is positioned over or above any working or public area, it should be fitted with a suitable stop at the outlet end.
- c) Care should be taken to avoid damage to the hose during use.
- d) Ensure that the delivery hose fitting on a boom pump is secured in position by a safety chain.



Delivery hose secured by safety chain

- e) Always use a delivery hose that has a pressure rating capable of accommodating the pumping concrete pressure. A steel reinforced delivery hose should be used with high pressure pumps such as those used on high-rise 'satellite' booms. As a guide, delivery hose that is not re-reinforced (sometimes called 'rag' or 'fabric' hose) should not be used on piston type pumps, unless the pumping pressure is within the maximum allowable hose pressure rating specified by the manufacturer. Where there is any doubt about the ability of the hose to withstand concrete pressures, written verification from the hose manufacturer should be obtained.

- f) Additional hoses added to the end of a concrete placement boom may cause structural failure of the boom, when the hose hangs from the end of the boom and concrete is pumped through it. Documentation should be available on site that shows the maximum size and length of hose that may be suspended, as stated by the boom manufacturer.
- g) The Safety Chain must be secured to the body of the reducer not to an attachment point.
- h) Reducers should be used as per the manufacturer's recommendations to avoid overload of the delivery hose or other parts of the unit.
- i) Appropriate PPE must be worn, including eye protection that complies with AS/NZS 1336:1997 - Recommended Practices for Occupational Eye Protection.
- j) Where possible the concrete truck driver should position themselves opposite to pump pipe work.

6.4

Line Cleaning (on site)

Risk

Line cleaning is usually performed with either high pressure water or air (refer to section 6.5), to ensure the dislodgement of residual concrete located in the pipeline. Dislodged concrete can act as a high-velocity projectile, potentially striking both workers during cleaning and those nearby (including members of the public). This risk should be considered by the principal contractor and the pump operator.

Risk control

A risk assessment must be performed and documented so that adequate controls are implemented to control the risks associated with line cleaning. When performing line cleaning the following safety precautions should be followed:

- a) Only experienced and trained pumping personnel should carry out line cleaning.
- b) Cleaning should be conducted in accordance with the manufacturer's instructions and PCBU's or other obligation holder's procedures.
- c) There should always be a connection to atmosphere (air relief valve) as well as the air entry point to the pipeline, which will allow the system to be depressurised before removing any pipeline.
- d) Never attempt to take a line apart to clean out a blockage or to dismantle it until after the pressure has been relieved.
- e) No pipeline connection or fitting should be disconnected unless it has been established that the pipeline has been de-pressurised.
- f) No pipeline is to be left unattended unless it has been established that the pipeline has been de-pressurised.
- g) Always remove the rubber delivery hose at the END of the pipeline, so that the hose cannot whip around dangerously when the line is being blown out.

- h) All parts of the pipeline should be secured to prevent movement during purging.
- i) A positive catchment device or properly designed receptacle should be attached to the discharge end of the pipeline to safely catch the cleaning device, while allowing concrete to flow.
- j) Keep all workers away from the discharge end while the concrete is under pressure.
- k) Ensure that all workers involved wear adequate personal protective equipment.

Note: environmental regulations may preclude line cleaning on the construction site.

6.5 Blowback

Allowing concrete to be blown back into the agitator barrel is an inherently dangerous procedure, unless it is carefully controlled. Air pressure can cause anything inside the pipeline to act as a high velocity projectile.

Some concrete suppliers do not permit blowback to be conducted at all and written approval must be obtained from those concrete suppliers that do permit blowback. A full risk management process must be completed prior to the commencement of the procedure and the concrete delivery driver must remain clear of the truck while the process is being conducted.

Risk

High pressure and pipe movement can cause pipe joints to fail and separate. Concrete under pressure during blowback can rebound from the rear fins and exit the barrel thereby damaging property and injuring bystanders.

Risk control

Risk controls for blowback include the following:

- a) Inform all people working in the vicinity of the blowback area about all of the risks.
- b) Blowback must occur via a well secured fixed line to prevent “whipping”. The steel pipe must extend 600 mm beyond the barrel drip ring.
- c) Appropriate work platforms must be provided to fit the blowback line - the pump operator is responsible for fitting the line.
- d) Where blowback is permitted, the truck must be legally able to hold the quantity of concrete being blown back.
- e) When using compressed air to clean a line, a pressure relief valve and “catch basket” must be used.
- f) The pump operator must inform the truck driver when blowback is due to commence and is completed.

Blowback

Hazard Identified

Allowing concrete to be blown back into the agitator barrel is an inherently dangerous procedure unless carefully controlled. Air pressure will cause anything inside the pipeline to act as a high velocity projectile.

Risk 1

High pressure and pipe movement can cause pipe joints to fail and break apart.

Risk 2

Concrete under pressure during blowback can rebound from the rear fins and exit the barrel damaging property and injuring bystanders.

Risk Reduction Measures

- Blowback must occur via well secured fixed line to prevent “whipping”. The steel pipe must extend 600 mm past the barrel drip ring.
- Appropriate work platforms must be provided to fit the blowback line - the pump operator is responsible for fitting the line.
- Where blowback is permitted the truck must be legally able to hold the quantity of concrete blown back.
- When using compressed air to clean a line, a pressure relief valve and “catch basket” are to be used.
- The pump operator must inform the truck driver when blowback commences and is completed.

Ongoing Actions

- Inform people working in the vicinity of the blowback area about these risks.
- Make this an agenda item at safety meetings.

Some premixed concrete suppliers do not permit blowback into their trucks and written approval must be obtained from those companies that do permit blowback.



Section 7 Miscellaneous Risks

7.1 Noise

Risk

Excessive noise at the workplace can cause industrial deafness, also known as noise - induced hearing loss. The National Occupational Health and Safety Committee's (NOHSC) – National Code of Practice for Noise Management and Protection of Hearing at Work NOHSC:2009 (2004) gives detailed information on the assessment of noise in the workplace. It is recommended that this be read in conjunction with these guidelines. Before pumping equipment is setup, consultation should be undertaken between the principal contractor or person in control of the workplace and the pump operator regarding the risk of excessive noise.

Risk control

- a) Noise levels from machinery or equipment during pumping operations may not be a risk to hearing or health.
- b) Suitable hearing protection equipment, and training in its maintenance and use, should be provided to the operators of the concrete pump and other associated equipment, if the noise is in excess of the noise exposure limits.

Euro V truck exhausts

Hazard Identified

A hazard has been identified with trucks manufactured to comply with Euro V Emission Standards. The exhaust maybe vented at ground level rather than above the cabin height.

Risk

If the exhaust is vented to the ground, situations where the engine is running for extended periods while the truck (e.g. concrete pump, mobile crane, concrete agitator, etc) is stationary, may result in breathing difficulties or illness for any person working in the vicinity of exhausts being emitted.

Risk Reduction Measures

- 1) Be aware of the exhaust location of trucks/plant operating in a stationary mode.
- 2) If you believe that the exhaust location is likely to cause a hazard, notify your supervisor immediately.

Ongoing Actions

Specify exhaust discharge above cabin height for plant/trucks that are likely to operate in a stationary mode. Make this an agenda item at safety meetings.

7.2 Fumes

Risk

All fumes should be identified and assessed for risk. Of most concern are exhaust gases from the concrete delivery truck and other internal combustion engines. Carbon monoxide is a hazardous substance and in large concentrations can cause permanent illness and death. An assessment of the truck, concrete pump and associated plant location is necessary, to consider the likelihood of gas build-up. This matter should be discussed by the principal contractor and the pump operator.

The NOHSC Code of Practice – National Code of Practice for the Control of Workplace Hazardous Substances NOHSC:2007 (1994) provides information about the assessment of risk when using hazardous substances, such as exhaust gas fumes. If the PCBU or self-employed person requires further information to adequately identify the risks associated with fumes, the above Code of Practice should be consulted.

Risk control

If possible the delivery truck should be located in a position that will eliminate or reduce the build-up of exhaust gas. If it is necessary to place the truck in an enclosed area steps must be taken to ensure that:

- a) An adequate level of ventilation is maintained to prevent the build-up of hazardous exhaust gases.
- b) Exhaust gases are vented to open air.

Gases should not vent to the back of the vehicle where workers are located.

7.3 Manual Handling

Risk

There are a number of manual handling tasks that may be required to be completed during the operation of a concrete pump which may present a risk to workers. These include:

- a) Handling timber pads, reducers, pipes and hoses.
- b) Using hammers on clamps and flapper box levers.
- c) Restraining a hose that is moving due to wind conditions, or as a result of poor positioning and placement.
- d) The laying out of hose.
- e) Moving beneath and over obstacles and obstructions.

Risk control

A risk assessment should be conducted prior to undertaking manual handling activities and all identified risks should be subjected to the hierarchy of controls. While there is more than one way to manage manual handling risks and hazards the following may be considered:

- a) Where practicable, establish clear walkways that are clear of all obstacles and debris. Non-slip ramps on inclines will also reduce risk.

- b) Maintain all tools and equipment in a good condition.
- c) Pre-plan all work prior to the commencement of the pour to ensure the placement of the pump, boom and hoses are optimised.
- d) Where practicable, use mechanical equipment for lifting and moving bulky equipment.
- e) Position bulk stores and equipment as practicable to where work is to be conducted.
- f) Wear the appropriate PPE at all times.

7.4 Cement

Risk

Overtime exposure to the cement in concrete may cause between five and 10 percent of workers to develop irritated skin or allergic dermatitis. Allergic dermatitis is usually caused by an allergic reaction to chromium salts found in cement and further exposure can lead to contact dermatitis.

The symptoms of dermatitis usually develop within 24 and 48 hour after exposure to cement and can include:

- a) A red rash and bumps on the exposed skin.
- b) Pain and tenderness on the exposed skin.
- c) Itching.
- d) Blisters.
- e) Dry, crack and red patches of skin that resemble burns.
- f) Scaly and thickened lesions.

Risk Control

As some components or additives in cement may be classified as a hazardous material the cement supplier may have to provide the principal contractor with a safety data sheet. The data sheets contain safety information on handling concrete and on what to do if significant health reactions occur.

To prevent cement related hazard the following risk control must be implemented:

- a) Wear appropriate PPE, such as gloves, safety goggles, long sleeves, long pants and waterproof footwear.
- b) If contact occurs wash affected areas with pH-neutral soap and rinse with clean water.
- c) If the symptoms of dermatitis appear refer to a doctor as soon as possible.

7.5

Provision of Personal Protective Equipment (PPE)

Worker in correct 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 pump operator and the principal contractor or person in control of the workplace, should assess any conditions that are likely to affect the health and safety of workers and arrange for the provision and use of appropriate PPE.

The following items of PPE are required to be worn when pumping concrete:

- Safety helmets.
- Eye protection.
- Hearing protection.
- Hi-vis shirt or reflective safety vest.
- Long sleeves.
- Long pants.
- Gloves.
- Safety boots.

7.6

Additional Equipment

Each pump unit is recommended to be equipped with the following items:

- First aid kit (must include eye wash).
- Protective creams, such as sun screen.
- Fire extinguishers (as appropriate).
- Sufficient reflective traffic cones (minimum 450mm high).
- Signs, such as operational safety and exclusion zones.
- Rubber boots.
- Waterproof clothing.

Product safety information

- Customers must ensure that all personnel who handle product are aware of the product Material Safety Data Sheet (MSDS) obtainable from the premixed concrete supplier.
- Direct contact with wet concrete will irritate eyes and skin and can cause dermatitis and severe chemical (caustic) burns. Do not kneel or rest any part of the body on wet concrete.

First aid: Flush eyes with plenty of water for at least 15 minutes and remove contaminated clothing and wash affected body area with soap and water.

- When handling wet concrete wear protective clothing and gloves and change them if they become wet.
- Wear eye protection, in compliance with AS/NZS 1336:1997 - Recommended Practices for Occupational Eye Protection).
- When cutting, drilling, sawing, chasing, sanding, grinding or breaking hardened concrete, silica dust may be released. Breathing silica dust over a period of time may lead to lung disease. Breathing dust in the short term may cause coughing and/or a sore throat. Dust may irritate eyes. Wear clean protective clothing.
- Wear a P1 dust mask (to AS/NZS 1715:2009 Selection, Use and Maintenance of Respiratory Protective Equipment / AS/NZS 1716:2012 Respiratory Protective Devices).
- Regularly wet and sweep or dry vacuum to stop dust build-up. Put dust in a covered container (wear PPE).

Appendix 1

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 not-for-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.

Appendix 2

Regulators

List of State and Territory SafeWork Authorities.

ACT	WorkSafe ACT Website: www.worksafe.act.gov.au Email: worksafe@act.gov.au Phone: 02 6207 3000	SA	SafeWork SA Website: www.safework.sa.gov.au Email: help@safework.sa.gov.au Phone: 1300 365 255
NSW	WorkCover NSW Website: www.workcover.nsw.gov.au Email: contact@workcover.nsw.gov.au Phone: 13 10 50	TAS	Workplace Standards Tasmania Website: www.wst.tas.gov.au Email: wstinfo@justice.tas.gov.au Phone: 1300 366 322
NT	NT WorkSafe Website: www.worksafe.nt.gov.au Email: ntworksafe@nt.gov.au Phone: 1800 019 115	VIC	WorkSafe Victoria Website: www.worksafe.vic.gov.au Email: info@worksafe.vic.gov.au Phone: 1800 136 089 or 03 9641 1444
QLD	Workplace Health and Safety Queensland Website: www.worksafe.qld.gov.au Email: safe@justice.qld.gov.au Phone: 1300 369 915	WA	WorkSafe WA Website: www.commerce.wa.gov.au/WorkSafe/ Email: safety@commerce.wa.gov.au Phone: 08 9327 8777

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Appendix 3 Safe Site Delivery Checklist

Your Name: _____ Date: _____

Site Location: _____ Job #: _____

Docket #: _____ Truck #: _____ Time: _____

Take Five to Stay Alive

- 1 Stop, look, walk around
- 2 Think through the task
- 3 Identify hazards
- 4 Control and communicate
- 5 Do the job safely

	Y	N		Y	N
Site Access			Site Access		
Safe and legal entry to site eg clear visibility, traffic control, signage	<input type="checkbox"/>	<input type="checkbox"/>	Safe reversing eg spotter visible, clear access	<input type="checkbox"/>	<input type="checkbox"/>
Surface/grade of access safe eg loose material, steep, soft ground	<input type="checkbox"/>	<input type="checkbox"/>	Clear of overhead hazards eg power lines, workers above	<input type="checkbox"/>	<input type="checkbox"/>
Access clear and unobstructed eg trees, steel storage, width	<input type="checkbox"/>	<input type="checkbox"/>	Pump positioning safe eg clear working space to discharge	<input type="checkbox"/>	<input type="checkbox"/>
Overhead clearance adequate eg powerlines, scaffolding, roofs	<input type="checkbox"/>	<input type="checkbox"/>	Grate in place on hopper	<input type="checkbox"/>	<input type="checkbox"/>
Pedestrian accesses defined and safe eg clear visibility, signage, barricades	<input type="checkbox"/>	<input type="checkbox"/>	Hose joints have safety locks	<input type="checkbox"/>	<input type="checkbox"/>
Safe and legal exit from site eg clear visibility, traffic control, signage	<input type="checkbox"/>	<input type="checkbox"/>	Pump E-stop accessible	<input type="checkbox"/>	<input type="checkbox"/>
			Two truck feed setup safe (if applicable)	<input type="checkbox"/>	<input type="checkbox"/>
Working Space			General (if applicable)		
Level ground provided eg potholes, rocks, loose materials	<input type="checkbox"/>	<input type="checkbox"/>	Adequate lighting provided	<input type="checkbox"/>	<input type="checkbox"/>
Fall protection provided eg barricades, open trenches, pits	<input type="checkbox"/>	<input type="checkbox"/>	Vehicle wash down area eg chute and wheel wash area	<input type="checkbox"/>	<input type="checkbox"/>
Clear of sharp objects/protrusions eg uncapped star pickets/reo bar, trip hazards	<input type="checkbox"/>	<input type="checkbox"/>			

List any other hazards you have identified that need to be rectified: _____

List any other hazards you have identified that need to be rectified: _____

**If you don't feel safe to work on this site then stop.
Immediately communicate any issues or changes on site to plant staff.**

Appendix 4

Customer Safety Agreement

Customer _____ **Supply agreement**

Occupational Health and Safety Compliance with Laws and Policies

Supplier _____ **agrees to:**

- a) Comply with all WH&S legislation, regulations and codes of practice relevant to the services and any agreed customer's _____ site safety requirements.
- b) Ensure that supplier's _____ personnel observe and adhere to any agreed customer's _____ WH&S policy.
- c) Appoint a representative of supplier's _____ to be responsible for occupational health and safety and environmental matters in connection with the services.
- d) Arrange and attend inductions every 12 months and before any services are provided at supplier's _____ expense.
- e) Ensure that all persons engaged to provide services as part of the contract are competent to carry out the activities/tasks at all times; as to not be injurious to themselves or others and to provide evidence, when requested by customer's _____ of all licenses, tickets or other forms of evidence demonstrating competency, and;
- f) Ensure that Supplier's _____ personnel observe and adhere to the WH&S requirements as highlighted in the induction program.

Customer _____ **agrees to:**

- a) Comply with all WH&S legislation, regulations and codes of practice relevant to the services and any customer's _____ Site Safety Requirements.
- b) Appoint a representative of customer's _____ to be responsible for WH&S and safety and environmental matters in connection with the contract.
- c) Arrange and provide inductions every 12 months and before any supply.
- d) Ensure that the work area is free from hazards to the health, safety and welfare of supplier's _____ employees required to be on site for the purposes of work.
- e) Ensure that customer's _____ personnel, customer's _____ head contractor's personnel and their sub-contractors observe and adhere to good WH&S practice (legal or otherwise) that will not present potential or actual harm to persons working on behalf of supplier _____
- f) Pay for WH&S controls (eg. tickets, procedures, hardware and modifications) that are in excess of supplier _____ minimum standards that have not been agreed to prior to the commencement of this agreement.

Appendix 4

Customer Safety Agreement

Customer _____ Workplaces

Customer _____ shall provide supplier _____ with such access to the site(s) and resources as is necessary to enable the supplier _____ to fulfil their obligations under this agreement.

If access to the site, processes or location of the job is deemed "unsafe" by Supplier _____ the supply will cease immediately until such time as the OH&S concern has been rectified and the changes have been agreed to by the supplier _____ appointed representative. In this case the customer _____ will not deem supplier _____ in breach of this agreement or otherwise be liable to the other by reason of any delay in performance or non-performance of any of its obligations to the extent that the delay or non-performance is due to any WH&S concern as duly notified by supplier _____ to customer _____

Customer _____ Workplace Access Protocols.

Prior to any supply being undertaken;

- a) A prestart checklist (WH&S Site Checklist or Site Pre-Start Checklist) must be undertaken prior to the commencement of each job phase and when the conditions of the job change the WH&S Site Plan. The content of the checklists and plan are to be agreed by both parties prior to implementation.
- b) An WH&S Site Plan must be developed by customer _____ and agreed to by supplier _____ 48hours prior to the delivery day.
- c) The WH&S Site Plan will need to include, but not be limited to, capabilities for pump set-up, 600mm access on dual pump feeds, provision for tyre wash, good communication between pump operator and agitator drivers, a spotter when reversing and an area for discharge which is free of overhead hazards (i.e. crane movements).
- d) Any pumps being used for the purposes of pumping concrete on site must be certified, have emergency stops on both sides within reach from ground level and be operated by suitably qualified personnel at all times.