Be aware. Be alert.

CEMENT CONCRETE
& AGGREGATES AUSTRALIA

Leading Knowledge - Sharing Information

The provision of a safe working environment is the responsibility of the project owner, the principal contactor and all parties involved in the project.

The purpose of this document is to complement CCAA's **Concrete Safe Site Delivery** brochure by providing additional information in relation to safe practices when working with or near concrete pumps.

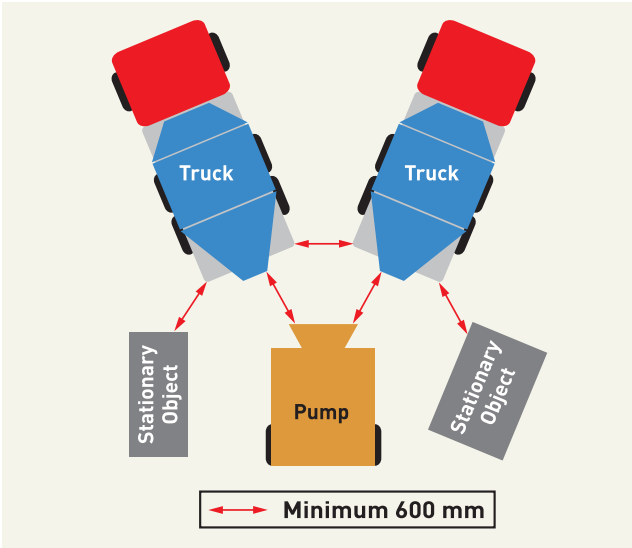
Injury and incident data of CCAA member companies was collated and analysed in the preparation of this brochure. This analysis showed that one of the most serious and frequent risks faced when working near a concrete pump is the explosive force generated from a line or coupling failure. The projectile concrete that is generated can cause significant injury.

What is required of the customer

The following must be provided for

Site access and traffic control

- A safe and legal entry to the site
- A spotter (traffic controller) to assist in conditions involving reversing in low light, low clearance, obstacles, tight access or vehicle and/or pedestrian traffic
- A safe route to the pump (including adequate signage). The pump is to be set up in a way that allows easy access to the pump and that does not require drivers to breach road rules when reversing onto the pump
- 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
- To provide a safe area for the driver to stand when discharging the concrete pumping area should be level and clear of building rubbish, materials or other slip/trip hazards.
- Areas around the concrete pump and delivery pipeline should be restricted to authorised personnel
- If concrete pumping is taking place on the roadside ensure that
  →a safe area to discharge is provided
  →the driver does not need to breach road rules while accessing, parking or discharging from the concrete truck



→the driver can safely exit the cabin and operate the mixer

→an exclusion zone using traffic control cones is provided

- A safe exit from the site is provided

Additionally for a 2 truck feed

- Provide a spotter to assist reversing trucks
- Provide a safe location for the spotter, pump operator and truck drivers to prevent them 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.
- Ensure a minimum clearance of 600 mm between trucks or stationary objects as shown in the diagram above
- If any of the above cannot be achieved permit only one truck at a time at the pump.

General requirements for all pumps

General safety equipment and precautions include but are not limited to

- The pump operator must be positioned to have clear vision of the pump hopper and truck driver, alternatively a spotter and adequate communication arrangements are required
- The pump hopper should be at a height that allows a gravity flow of concrete into the hopper

- The pump must be fitted with a secure hopper grate constructed of parallel bars. Spacing between bars should not exceed 70 mm and the distance from the grate to moving parts should be at least 150 mm to prevent any contact
- No one is permitted to place their hands in the hopper when the pump is working
- No one is permitted to stand or walk on the hopper grate when the pump is working
- An emergency stop must be located within easy reach of the concrete truck driver
- Safety chains are to be fitted on any slurry caps
- Safety pins are to be fitted to all couplings and clamps
- Washing into the pump hopper is inappropriate. The site should provide adequate wash areas for the pump and agitators.

Additionally for Boom Pumps

- Boom pump certification must be displayed at all times
- Boom operator to be certified by WorkCover and at least one additional trained linesman provided during pumping
- Earth straps are to be fitted when working near power lines (in accordance with AS 2550)
- The boom should not be used as a crane
- The boom should not be rotated over trucks or drivers
- The delivery hose is to be secured by a safety chain, webbing or cable
- Only one (1) drop hose is to be fitted to the boom
- Outriggers must be correctly set up with adequate bearing area to ensure stability.
- Pump must be set up to a level within manufacturer's recommendations
- Analysis of discharge chute height and concrete slump must be considered to allow flow of concrete. This may require ramps or set downs to be provided.

Lines, couplings and fittings

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.

- No one is to stand within 10 metres of a leaking pipe or fitting when the pump is operating
- Each section of vertical pump line is to be individually supported at no more than 3 metres apart.
- All pressurised components (line, coupling, bends etc) are to be fitted with an identification tag
- Testing of pipelines is to be carried out and recorded in a logbook that is kept with the pump as prescribed by AS 1418.15 and the regulations of the applicable State Authority

Minimum pipe wall thickness guide (Single Wall)

The table below is reproduced from WorkSafe Victoria's *Concrete Pumping Industry Standard*. The table, provides a guide to minimum wall thicknesses for 108 mm and 133 mm O/D seamless steel pipes for a range of steel strength grades at different pump pressures (assuming normal operating conditions). The specified wall thicknesses may not be used for other strength grades of pipe or diameters. Note: Twin wall pipes are to be tested according to the manufacturer's reccomendations.

Minimum Wall Thickness Guide (mm)							
Max Pressure		**Outside Diameter of Pipe**					
kPa	Bar	Grade 200		Grade 250		Grade 350/ST-52	
		108mm	133mm	108mm	133mm	108mm	133mm
4,500	45	2.2	2.7	1.7	2.1	1.3	1.6
6,000	60	2.9	3.5	2.3	2.8	1.7	2.1
8,000	80	3.8	n/a	3.0	3.7	2.3	2.8
10,000	100	n/a	n/a	3.8	n/a	2.9	3.5
12,000	120	n/a	n/a	n/a	n/a	n/a	n/a

Notes: 1. Where the strength grade of the pipe is not known use Grade 200 steel
2. Where the maximum concrete pump pressure is not known use 12,000 kPa pressure
3. Where the minimum pipe wall thickness is indicated in the table above as n/a the pipe manufacturer's advice must be sought

Pump inspections

Inspections must be undertaken at the frequencies listed below

- Daily - Pre–start check by operator
- Monthly - All metal pipeline, reducers, bends, hose and couplings are to be ultrasonically tested. Rubber hoses and couplings are to be visually inspected. The results must be entered in the log book.
- Yearly - Inspection by a competent person
- Six yearly - Full structural inspection

Electricity

The details provided below apply in NSW only. Refer to the applicable regulatory authority for other States.

- Boom pumps must observe the following minimum approach distances from overhead power lines
  - →3 m - up to 132,000 volts
  - →6 m - from 132,000 to 333,000 volts
  - →8 m - over 330,000 volts and where the voltage is not identified
- At voltages of 11,000 and greater the pump and hoses, concrete, boots and timber are all effective conductors and everything the pump touches or that is touching the pump at these voltages will be affected
- WorkCover NSW has published a Code of Practice *Work Near Overhead Power Lines* - that allows reduced approach distances if strict criteria are met

Blockages

A pressurised line must never be opened. Pressure is to be relieved (usually by two or more reverse pump strokes) before any lines are broken

Blowback

Allowing concrete to be blown back into the agitator barrel is an inherently dangerous procedure unless carefully controlled.

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

[Refer to CCAA's *Industry Safety Flag - Blowback* for further details)

What is required of the concrete truck driver

Personal Protective Equipment (PPE)

Follow all site Occupational Health & Safety [OHS] requirements including PPE

- Wear safety glasses and hearing protection when working near machinery
- Wear high visibility clothing and steel capped footwear at all times

General

Seek assistance from a responsible person either on site or at the plant if there are any safety concerns

- When being directed on site do not continue if the spotter cannot be clearly seen. **NO SEE - NO MOVE**
- Observe the requirements for two trucks on a pump
- Do not stand between the truck and the pump when operating the mixer
- Ensure that the truck reverse warning system is operational
- Ensure that customers and contractors do not operate or access any part of the truck

References

1. CCAA *Concrete Safe Site Delivery*
2. CCAA *Industry Safety Flag - Two Trucks on a Pump*
3. CCAA *Industry Safety Flag - Blowback*
4. The Concrete Pumping Association of NSW *Pump Safe Australia* Safety Manual
5. WorkCover NSW Code of Practice *Pumping Concrete*
6. WorkCover NSW Code of Practice *Work Near Overhead Power Lines*
7. WorkSafe Victoria *Concrete Pumping Industry Standard*
8. Queensland Department of Industrial Relations *Concrete Pumping Code of Practice*
9. CCAA *Concrete Pumping Guide for the Premixed Concrete Industry in South Australia*

Builder/Site Controller Checklist

Item	Requirement	Yes/No/NA
Documentation	Pump operator follows the applicable regulatory authority Codes of Practice	
Documentation	Current log books are available and include records of pipe testing	
Documentation	Pre–start check is completed	
Documentation	Safe Work Method Statement (SWMS) or Job Safety Analysis (JSA) includes pump set-up, operation, clearing blockages and cleaning	
Documentation	Evidence that operators are trained in SWMS or JSA	
Pump Inspection	Pump has an emergency stop at the hopper	
Pump Inspection	Pump is fitted with a secure hopper grate	
Pump Inspection	Safety pins are fitted to all couplings and clamps	
Boom Pump Only	Boom pump is registered with the applicable regulatory authority	
Boom Pump Only	Boom pump operator and dogman have a certificate of competency and there is at least one additional trained linesman	
Boom Pump Only	Pump outriggers are set up correctly and on firm ground	
Boom Pump Only	Earth straps are fitted when working near power lines	
On Site	Pump area is level and clear of hazards	
Traffic control	A spotter is available to assist in difficult conditions	
Traffic control	A spotter is available to assist reversing trucks for a two truck feed	
Traffic control	An exclusion zone is provided if discharging from the roadside	
Traffic control	Pump location permits truck to safely reverse onto pump and enables a minimum 600 mm gap between truck(s) and/or stationary object(s) to be maintained	
Traffic control	No-one (including pump operator) is permitted to stand between a reversing truck and pump or nearby stationary objects	
Power Lines	A minimum safe clearance to power lines is maintained (contact the relevant authorities for clearances)	

This checklist is to be used as a guide only. For more detailed information refer to this brochure, CCAA's *Concrete Safe Site Delivery* brochure and applicable safety regulations. Be aware. Be alert.

This brochure is endorsed by the Concrete Pumping Association of NSW Inc.

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CEMENT CONCRETE & AGGREGATES AUSTRALIA

CCAA OFFICES

SYDNEY OFFICE:
Level 6, 504 Pacific Highway
St Leonards NSW Australia 2065
POSTAL ADDRESS:
Locked Bag 2010
St Leonards NSW 1590
TELEPHONE: (61 2) 9437 9711
FACSIMILE: (61 2) 9437 9470

BRISBANE OFFICE:
Level 14, IBM Building
348 Edward Street
Brisbane QLD 4000
TELEPHONE: (61 7) 3831 3288
FACSIMILE: (61 7) 3839 6005

MELBOURNE OFFICE:
2nd Floor, 1 Hobson Street
South Yarra VIC 3141
TELEPHONE: (61 3) 9825 0200
FACSIMILE: (61 3) 9825 0222

PERTH OFFICE:
45 Ventnor Avenue
West Perth WA 6005
TELEPHONE: (61 8) 9389 4452
FACSIMILE: (61 8) 9389 4451

ADELAIDE OFFICE:
Greenhill Executive Suites
213 Greenhill Road
Eastwood SA 5063
POSTAL ADDRESS:
PO Box 229
Fullarton SA 5063
TELEPHONE: (61 8) 8274 3758
FACSIMILE: (61 8) 8373 7210

Extractive Industries and
Premixed Concrete Office:
PO Box 243
Henley Beach SA 5022
TELEPHONE: (61 8) 8243 2505
FACSIMILE: (61 8) 8125 5822

TASMANIAN OFFICE:
PO Box 246
Sheffield TAS 7306
TELEPHONE: (61 3) 6491 1509
FACSIMILE: (61 3) 6491 2529

WEBSITE: www.ccaa.com.au
EMAIL: info@ccaa.com.au

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