Code of Practice for the Safe Use of Concrete Pumps

CPA

Foreword

This code of practice has been prepared by the British Concrete Pumping Group, a part of the Construction Plant-Hire Association.

It should be used in conjunction with the relevant legislation and guidance to ensure the safe use of concrete pumps. This standard will provide the guidance necessary to ensure that the operations involving concrete pumps are carried out safely and efficiently.

It has become clear to members of the Interest Group that such a code of practice is necessary to define safe systems of work to ensure the solid foundations required for safe and successful operations.

It should be noted that this code of practice provides the minimum standards necessary for the operation of all types of concrete pumps in addition to any other guidance and legislation that might be appropriate.

Contents

1. Scope

1.1 This Code of Practice gives recommendations for the safe use of lorry-mounted concrete pumps; some sections will apply to the use of static concrete pumps, trailer-mounted concrete pumps and tower-mounted booms. It does not cover plaster and screed pumps.

1.2 It does not relate to the construction of the machine; this is treated by the (draft) European Standard for concrete pumping and spraying machines, etc. PrEN 12001 and by the British Standard for the Safe Use Of Machinery, B.S. PD5304: 2000.

2. Definitions

For the purposes of this code of practice, the following definitions apply:

2.1 ***'Concrete pump'*** means an item of plant used for pumping or spraying concrete. It works by pistons or a rotary pump, whereby the material to be transported is conveyed to the placing position through a pipeline alone or through a pipeline attached to a concrete-placer boom.

2.2 ***'Lorry-mounted concrete pump'*** means a concrete pump that is mounted on a self-propelled lorry.

2.3 ***'Trailer-mounted concrete pump'*** means a concrete pump that is mounted on a trailer that can be towed.

2.4 ***'Concrete-placer boom'*** means a device to support and position the delivery pipeline. It can incorporate folding, derricking and slewing motions.

2.5 ***'Him'***, ***'his'*** and ***'himself'*** can also mean the female equivalent.

2.6 ***'Competent person'*** means a person who has had sufficient experience, instruction and training to enable him her to carry out his duties without risk to himself or any other persons and without risk of damage to plant or property.

2.7 ***'Concrete'*** means a homogenous mix of cement, graded aggregate and water, to which non-toxic additives may be added.

2.8 ***'Admixture'*** means a material, which is added to concrete to change the properties of the mix.

2.9 ***'Remote control box'*** means a portable control panel, which is connected to the concrete pump by a wired or wireless system, allowing the concrete pump operator to operate the machine from a remote position. The control levers / switches may operate the placer-boom movements, the concrete pump and the vehicle engine.

2.10 ***'Pipelines or delivery lines'*** are lines, whether steel or rubber, through which the concrete is conveyed. They will include, pipes, hoses, coupling connectors and any valves inserted in the line. Each element of the line must be capable of resisting the likely maximum pressure exerted by the concrete pump.

2.11 ***'Placement hose'*** means a flexible hose to provide freedom of movement in the final placing of concrete.

2.12 ***'Delivery hose'*** means a flexible hose used in the pipeline other than as a placement hose.

2.13 ***'Stabilisers'*** means extendable structural members on the pump unit to increase the dimensions of the stability base.

2.14 ***'Receiving hopper'*** means a hopper into which the mixed concrete is discharged. It will contain the valve gear for transferring the concrete from the concrete pistons into the delivery line. It may also contain mixer paddles on a revolving shaft. Access doors and an interlocked protective grille must be fitted to prevent persons from coming into contact with the moving machinery.

2.15 ***'Safety induction training'*** means instruction given by the principal contractor or the hirer to communicate the site safety rules, safe access on the site, the location of welfare facilities, etc. The provider of the training may determine that the delivery of induction training on the first visit to the site is sufficient but may insist on further training if site conditions change significantly.

2.16 ***'Interlock'*** means facility for stopping the pump.

2.17 ***'Wash-out adapter'*** means a short length of pipe with one end blanked off and a connection for a water / compressed air hose for cleaning purposes. A secondary valve should be fitted for releasing the pressure when necessary.

2.18 ***'Ball-catcher'*** means a device fitted to the delivery end of a pipeline designed to catch the sponge rubber device used for cleaning the pipeline.

2.19 ***'Boom tip safety chain'*** means a chain fitted to the end of the concrete-placer boom which is attached to the placing hose and which is designed to retain the placing hose if the coupling attaching it to the boom pipeline fails.

2.20 ***'Signaller'*** means a person who has had training to give directions to the concrete pump operator by a recognised code of signals or by verbal communication.

2.21 ***'Blanking piece'*** means a plate designed by the concrete pump manufacturer fitted securely at the outlet end of a placement hose with a coupling or other device to prevent concrete from falling out of the hose while the boom is being moved to a new position.

2.22 ***'Sponge rubber cleaning device'*** means a piece of sponge rubber, usually in the shape of a ball, which is inserted into the delivery pipeline for the purpose of cleaning the inside of the pipes. It is propelled along the pipeline either by the action of the pump (forward or reverse), by compressed air or by water pressure.

3. Selection of personnel

The safe operation of a concrete pump relies heavily on the selection of suitable personnel who are competent to carry out the required duties. Those responsible for the selection should ensure that an operator is efficiently organised in order to promote good teamwork in the working situation.

Nobody should be selected whose efficiency is impaired by alcohol, drugs or other influences. Employers should have a policy on drugs and alcohol.

3.1 The concrete pump operator should:

a. be competent;
b. be over 18 years of age if operating a concrete pump on the site and over 21 years of age if driving a concrete pump on the highway;
c. be medically fit, with particular regard to eyesight, hearing and reflexes;
d. be physically able to operate the concrete pump safely;
e. be able to judge distances, heights and clearances;
f. be adequately trained and certified for the class of concrete pump which he operates;
g. have sufficient knowledge of the machine and its safety devices;
h. be fully conversant with the duties of the signaller and should understand the signals code agreed with him;
i. be authorised to operate the machine;
j. in the case of a mobile concrete pump operator, be qualified to drive a large goods vehicle (Class C)

3.2 Evidence that the operator is medically fit to operate the machine should be obtained at intervals not exceeding 5 years.

3.3 An appointed signaller should be able to:

a. Relay signals from the placing gang to the pump operator;
b. Direct safe movement of the concrete-placer boom;
c. Give clear and precise verbal instructions where audio equipment, e.g. a two-way radio, is used.

4. Training and certification

4.1 In accordance with the Health and Safety At Work, Etc., Act 1974, the employer must ensure, so far as is reasonably practicable, that employees receive "such information, instruction, training and supervision as is necessary to ensure" their health and safety at work.

4.2 It is essential that formal training is given and can be shown to have been given.

4.3 Training of the concrete pump operator should include:

a. safety awareness training;
b. setting the machine up safely in site conditions;
c. operating the boom safely;
d. operating within the rated safe working load of the boom;
e. operating the concrete pump;
f. cleaning the machine out;
g. folding the machine up;
h. working with pipelines;
i. awareness of the dangers of compressed air;
j. work adjacent to overhead power lines;
k. dealing with emergency situations;
l. working with blockages;
m. personal health and safety considerations;
n. pre-driving checks;
o. driving of the lorry;
p. necessary daily and weekly checks and maintenance of the machine;
q. documentation in relation to the job.

4.4 The training must be to a nationally recognised standard that is measurable. The completion of training must be followed by the issue of a certificate of training achievement.

4.5 Operator competence can be assessed further by the attainment of a National Vocational Qualification level 2 qualifications for Specialist Plant and Machinery Operations – Concrete Pumping.

4.6 Periodic assessments of each operator should be carried out by a competent person to verify the maintenance of safe standards and to assess any further training needs.

4.7 Specific training and assessment must be carried out whenever an operator is transferred to a different machine.

4.8 Personnel undergoing training must be adequately supervised.

4.9 The concrete pump operator should always be able to show to site management proof of training.

4.10 The signaller, appointed by the hirer, should be instructed on:

a. the use of the code of signals in Appendix C;
b. the use of any communications device supplied;
c. any special risks on the site, e.g. overhead obstructions, etc.

5. Management of the concrete pumping operation

All concrete pumping pours should be planned to ensure that they are completed safely and that all foreseeable risks have been taken into account. Planning should be carried out by personnel who have the appropriate expertise. In cases of repetitive concrete pours, this planning may only be necessary in the first instance, with periodic reviews to ensure that no factors have changed.

5.1 The concrete pump owner should be able to supply a risk assessment to the customer, detailing the generic risks in concrete pumping.

5.2 To assist the Hirer to select the correct model of concrete pump, the concrete pump owner should be able to supply details of:

a. the maximum reach of each concrete-placer boom, both horizontally and vertically;
b. the standard equipment carried on a lorry-mounted concrete pump;
c. the weights of pipeline, placement hoses, delivery hoses and accessories;
d. the maximum likely loadings for each of the stabiliser bases;
e. the footprint of the machine with all stabilisers extended;
f. the boom configuration;
g. the maximum safe wind speed for the operation of the boom.

5.3 The owner should make reference to a concrete pump hire checklist, such as in Fig. 1, to assist the hirer to select the correct machine for the job.

5.4 A safe system of work should be established by the hirer and this should be followed for every concrete pumping operation whether it be an individual pour or a series of pours.

5.5 The hirer should include in the safe system of work from the arrival of the lorry-mounted concrete pump on site to its departure:

a. a site-specific risk assessment;
b. the preparation of a method statement;
c. the planning of the operation;
d. the selection, provision and use of a suitable concrete pump and boom;
e. the need for additional delivery pipes in addition to the standard kit carried;
f. the position of the concrete pump and any necessary preparation of the site for its positioning;
g. the site of the pour, taking into account proximity hazards, space availability and suitability of the ground to support the weight of the concrete pump;
h. the provision of properly trained and competent personnel who have been made aware of their relevant responsibilities under the Health and Safety At Work, etc., Act 1974.
i. the requirement for all personnel to be able to communicate clearly;
j. adequate supervision by competent personnel;
k. ensuring that all necessary documentation is available for inspection and valid;
l. preventing unauthorised use of the concrete pump and boom;
m. ensuring the safety of persons not involved in the pumping operation;
n. the provision of a cleaning-out area, taking into consideration all environmental issues;
o. adequate lighting;
p. the provision of a supply of suitable and sufficient concrete of a consistency which is readily pumpable at a sustainable rate;
q. the provision of an adequate piped water supply at the pump position.

5.6 The concrete pumping operation should be taken to include any necessary preparation of the site.

5.7 The safe system of work should be effectively communicated to all personnel involved in the operation.

5.8 Special concrete pumping operations, such as underwater work and working with piling rigs must be discussed with the concrete pump owner before the work is carried out.

6. Selection of concrete pumps

6.1 Concrete pumps are available in a number of sizes and pumping capacities. The characteristics of each concrete pump should be considered in relation to the job requirements.

6.2 Points to be considered by the hirer in requesting a suitable concrete pump include:

a. access to and egress from the site suitable for the size of the machine;
b. sufficient area for all the machine's stabilisers to be fully deployed;
c. the ability of the ground to support the loads likely to be imposed by the machine's stabilisers;
d. underground restrictions, e.g. cellars under pavements, cables close to the surface;
e. overhead obstructions, e.g. cables and structures; it is the hirer's responsibility to devise a safe method of working in the vicinity of overhead cables;
f. the reach of the boom to the most remote point of the concrete pour;
g. suitable access for the ready-mixed concrete truck to the receiving hopper of the concrete pump;
h. the need for a signaller in circumstances where the operator will not be able to see the delivery end of the pipe-line;
i. adequate protection of the permanent works from potential damage by the placer-boom;
j. any special operational requirements or limitations imposed;
k. the need for additional delivery pipeline to supplement the boom pipeline;
l. the need for properly designed support for the additional pipe-line, e.g. the attachment of the pipe-line to a scaffolding structure;
m. the need for the hirer to maintain any hirer-owned pipeline, for which the concrete pump owner has no responsibility;
n. the conditions of hire, particularly in respect of insurance aspects.

6.3 The concrete pump owner should select the machine to be sent to a site on the basis of the following considerations:

a. points included in item 6.2 above (a to g);
b. the distances to be driven to and from the site by the operator to reduce the road safety risk element;
c. the hours worked by the operators on the previous day and the estimated rest period between their jobs;
d. the need for additional labour, e.g. for pipeline work.

7. Travelling to and from the site (lorry-mounted concrete pumps)

7.1 Employers and employees should consider the journey in the lorry-mounted concrete pump to and from the site as an extension of the place of work.

7.2 Sufficient time should be allocated by the employer to allow the concrete pump operator to drive to the site without the need to exceed speed limits or take risks on the road in general.

7.3 The concrete pump operator should use the time allocated by the employer to ensure that the concrete pump is safe for the road, e.g. by checking the function of the lorry's lights and other essential pre-driving checks;

7.4 The concrete pump operator should not take unnecessary risks on the journey, taking care for his own safety and health and that of other road users and others who may be affected by his actions.

8. Arrival on site and setting up the machine

The concrete pump operator is responsible for the correct operation of the concrete pump in accordance with the manufacturer's instructions and within the safe systems of work.

8.1 On arrival, the concrete pump operator must report to the site office before entering the actual site.

8.2 The concrete pump operator must attend safety induction training as required by the site.

8.3 The concrete pump operator must use only authorised routes across the site.

8.4 It is the hirer's responsibility to assess the ground conditions and determine its suitability to support the lorry-mounted concrete pump.

8.5 The position of the machine must be determined by the hirer after discussion with the owner, bearing in mind the ground conditions, the distance to the concrete pour, suitable access for the concrete delivery lorries, the working position of the concrete pump operator.

8.6 Overhead cables must be considered when setting up the machine; the boom must never be positioned where it might touch overhead cables or where electricity might arc to the boom. A safe method of working in the vicinity of overhead cables must be included, if appropriate, in the overall safe system of work.

8.7 Regard should be given to the proximity of cranes or other concrete pump booms, especially when working areas overlap.

8.8 Underground voids, e.g. new drainage trenches and manholes, should be avoided when determining the positions of stabilisers.

8.9 The manufacturer of the machine specifies the maximum wind speed in which it is safe to operate a concrete-placer boom. It is the responsibility of the hirer to verify that the wind speed at the site is not in excess of the limit specified by the manufacturer.

8.10 All stabilisers must be fully deployed in accordance with the manufacturer's instructions; where appropriate, soleplates should be used under the stabiliser base plates to spread the loading from the machine.

8.11 All soleplates must be of adequate strength and size to support and distribute the loads likely to be applied.

8.12 It is the responsibility of the site management to provide suitable hard standing for the machine to be set up; it must be capable of adequately supporting the loads likely to be imposed on it.

8.13 The machine should carry information on the maximum load likely to be applied to each stabiliser.

8.14 The function of all controls and safety devices should be checked by the concrete pump operator for correct working before pumping commences.

8.15 Guards to all dangerous moving machinery must be in place at all times while the machine is working.

9. During the pour

If, in the opinion of the concrete pump operator, there is a risk of injury to himself or other persons, damage to property or his machine, caused by the operation of the pump or boom, the operation must cease immediately and consultation with the hirer sought without delay.

9.1 The boom must never be operated in a position where it might come into contact with live electricity cables or approach them to a point where the electricity arcs to the boom. The concrete pump operator must work to the safety clearance distances as instructed by the hirer before work commences.

9.2 The combination of the noise levels from different items of plant may exceed the action levels in the Noise at Work Regulations 1989. The concrete pump operator should be supplied with appropriate ear defenders and be instructed on the use of them in accordance with the Regulations.

9.3 A code of signals must be agreed between the concrete pump operator and a representative of the concrete placing gang before pumping starts.

9.4 The availability of a remote control box, whether operated by cable or by radio signals, allows the concrete pump operator to select the optimum position from which to operate the pump and boom. This position will vary according to the work in hand. The concrete pump operator should select the position that offers the safest overall position for the job.

9.5 When a remote control box is in use, any other controls on the machine must be isolated or access to them by unauthorised personnel prevented.

9.6 If the concrete pump operator is required to position himself where he cannot see the concrete placing gang, the site must supply a signaller to give appropriate signals to the concrete pump operator. See Appendix C.

9.7 When the concrete pump operator cannot see the concrete level in the machine's receiving hopper, it is the responsibility of the hirer to appoint a person who is competent to monitor the level of concrete in the receiving hopper and convey signals to the concrete pump operator when the level is at its safe minimum. It is not acceptable to hold the driver of the ready-mixed concrete truck responsible for advising the concrete pump operator when the concrete level is low in the receiving hopper.

9.8 The concrete pump operator should at any one time respond only to the signals from the appointed signaller, who should be clearly identified.

9.9 The concrete pump operator must respond immediately to signals given by a signaller.

9.10 Until concrete is flowing smoothly out of the end of the delivery hose, or when a blockage occurs in the boom pipeline, all personnel should remain clear of the delivery hose and the placing boom.

9.11 The danger zone is the area around the delivery hose in which the delivery hose can strike out. The diameter of the zone is twice the length of the delivery hose.

9.12 If a blockage occurs during the pour, the concrete pump operator must stop pumping immediately and instruct personnel to move to a safe position before attempting to remove the blockage.

9.13 If the concrete pump operator needs to open the delivery pipeline to clear a blockage, he must first release the pressure inside the pipeline as much as possible, e.g. by reversing the pumping action. The pipeline must be treated as being pressurised at all times. Appropriate and adequate eye protection must be worn when opening the pipeline.

9.14 The hirer is to ensure that site personnel **DO NOT** under any circumstance open or attempt to open the pipeline under pressure.

9.15 All members of the concrete placing gang should wear, as a minimum, a safety helmet, safety footwear, impervious gloves / gauntlets, suitable eye protection and high visibility clothing.

9.16 The person directing the flexible placing hose of the concrete pump should hold it loosely at arm's length, directing the pump operator to move the boom to the required position.

9.17 For the purpose of moving a flexible delivery hose lying on the ground, a rope should be tied around it near to the delivery end.

9.18 Arrangements must be made to extract exhaust fumes when the machine is operating inside a building.

9.19 If the concrete pump has to be left unattended, the operation of the boom and pump must be isolated.

9.20 The maximum length of end hose to be suspended from the end of a boom is specified by the manufacturer and must not be exceeded.

9.21 Concrete must be prevented from falling out of the delivery hose when the boom is being manoeuvred over personnel or property; where necessary and available, a blanking piece, fitted in accordance with the manufacturer's instructions, should be used.

9.22 The boom must never be used as a means of hoisting equipment unless it is so designed and operated to BS 7121, Code of Practice for the Safe Use of Cranes.

9.23 Securing pins must be fitted to all pipe couplings to prevent them from opening accidentally.

9.24 The hopper grille must be in position at all times during the pumping operation.

9.25 If the lorry-mounted concrete pump has to be moved on site, the boom must always be folded to the travelling position.

9.26 The concrete pump operator must comply with the site's traffic management arrangements.

9.27 It is the responsibility of the hirer to ensure that alterations in the site traffic management arrangements necessitated by the presence of the mobile concrete pump and concrete-mixer lorries are adequate and implemented.

10. Work with pipelines

10.1 The hirer is responsible for providing adequate resources to assist the concrete pump operator in handling pipes and accessories.

10.2 Pipes and couplings must be selected in accordance with the anticipated pressure in the pipeline.

10.3 The thickness of steel pipes must be checked periodically against the manufacturer's tolerances.

10.4 All horizontal and vertical pipes must be adequately supported.

10.5 All couplings must be in good order and correctly fitted with a good rubber seal and a securing pin; the bolts of bolted couplings must be capable of being tightened fully.

10.6 Before a pipeline is fitted to a scaffold, the hirer must confirm that the scaffolding is designed and constructed to take the extra loading to be imposed. Purpose-made clips must be used to attach the pipeline to the scaffold.

10.7 Working platforms, in compliance with the Construction (Safety, Health and Welfare) Regulations 1996, must be provided for the purpose of attaching pipes to scaffolding.

10.8 On occasions it will not be feasible, practicable or even possible to clean out the delivery pipeline by the conventional method. Such situations may include exceptionally long pipelines, the use of fast-setting concrete, very hot weather, when the concrete pump has broken down, etc. It may be necessary in these circumstances to use compressed air.

10.9 The use of compressed air to clean out a pipeline should only be used where there is no practical alternative. The operation must be carried out under the close supervision of a suitably trained person.

a. It is essential that personnel involved in the operation wear protective clothing, a safety helmet and eye protection, preferably a full face visor of the appropriate grade.
b. The pump operator should establish effective communications with site personnel and should ensure that all personnel stand clear of the pipeline, particularly at the discharge end.
c. All flexible hoses must be removed from the pipeline.

d. The pipeline must be fully supported and secure.
e. There must be no bends in the final 15m. of the pipeline
f. A ball-catcher attachment must be fitted to the discharge end of the pipeline to catch the sponge washout ball, which could otherwise be expelled with great force.
g. The maximum output from the compressor should not exceed 7 bar.
h. Compressed air should be introduced into the pipeline through a purpose-made washout adapter, designed for the purpose. The adapter must be equipped with an air entry control valve and an emergency pressure release valve.
i. The compressed air should be introduced gradually, sufficient only to move the sponge rubber cleaning device steadily along the pipeline.
j. A competent assistant should follow the progress of the sponge rubber cleaning device while the concrete pump operator controls the ingress of compressed air. By tapping the pipes with, for example, a hammer, the assistant can establish which pipes have been emptied.
k. As the sponge rubber cleaning device progresses and the resistance of the concrete decreases, the flow of air introduced into the pipeline should be reduced by the concrete pump operator.
l. Air must be exhausted via the emergency valve whenever the speed of the discharge of concrete becomes too rapid.
m. The pipeline must be considered to be pressurised during the cleaning process and no couplings should be loosened or removed unless the pressure in the pipeline has been released and this has been confirmed by the concrete pump operator.

11. Pumping special concretes

Many forms of concrete exist beyond the standard mixes that can be pumped. Each should be considered as a special case. The nature of the concrete can have serious consequences for the concrete-placer boom and for the concrete pump operator.

11.1 Chemicals added to the concrete must be considered by the hirer and the concrete supplier. Information on the admixture, which is relevant to health and safety, must be given to the client by the supplier.

11.2 The hirer should assess the risks to the health of the concrete pump operator and give the operator information and advice on the risks and the protective measures necessary. This is a requirement of the Control of Substances Hazardous to Health Regulations.

11.3 The density of special concretes should be considered. When very dense concrete, e.g. that containing heavyweight lead shot, is to be pumped, the concrete pump boom manufacturer's recommendations must be considered.

11.4 Foamed concrete and air-entrained concrete can be compressed in the pipeline, particularly if there is a blockage or partial blockage. It is essential that all pressure is dissipated from the pipeline before it is opened.

12. Cleaning out the machine and pipelines

Cleaning out a concrete pump and its pipeline is a specialist operation, which must be left to the pump operator. The operator may require assistance cleaning out the pipeline and this must be carried out under his supervision.

12.1 Lorry-mounted concrete pumps generally carry their own supply of water for cleaning the boom pipes and hopper. However, in cases of more than one pour, it may be necessary for the site to provide a water supply.

12.2 The cleaning process involves the deposit of some waste concrete on the site. The concrete pump must be washed out only in the area designated by the hirer.

12.3 Before working in the receiving hopper, the concrete pump operator must always switch off the engine, vent the hydraulic pressure and ensure that the agitator control lever is in the neutral position.

13. Leaving the site (lorry-mounted concrete pumps)

13.1 Before leaving the site, the concrete pump operator must ensure that the concrete-placer boom is properly stowed and that all equipment is securely loaded.

13.2 Concrete should not be carried in the receiving hopper on the highway.

13.3 The vehicle tyres should be checked for damage, cuts, nails or screws in the tread and material trapped between twin wheels.

14. Personal protective equipment

The concrete pump operator is likely to be exposed to a variety of conditions; the majority of them cannot be avoided. Accordingly, suitable protective equipment to the appropriate British Standard must be issued to the operator.

14.1 The minimum protective equipment should comprise:

a. a safety helmet;
b. safety footwear;
c. overalls;
d. eye protection;
e. ear defenders;
f. high visibility clothing to EN 471 standard;
g. impervious gloves or gauntlets;
h. barrier cream;
i. waterproof clothing;
j. a first aid kit.

14.2 Employees may not be charged for personal protective equipment.
14.3 Personal protective equipment must be replaced by the employer as necessary

14.4 Other personal protective equipment should be supplied when a risk assessment deems it necessary.

15. Testing of concrete-placer booms

15.1 In certain conditions, for example after substantial repairs to the boom, the competent person who examines the machine may specify the requirement for a load test to demonstrate that it is stable and / or structurally sound. Load testing of a concrete-placer boom should only be carried out under the direction and close supervision of a competent person.

15.2 Careful consideration should be given to the condition of the site where the test is to be conducted. It should be remembered that the recommendations provided in the operating instructions for the machine relate to operations within the safe working load and that more stringent requirements apply when loads are being applied for the purpose of testing.

15.3 Recommendations for the safe conduct of a load test of a concrete-placer boom are included in Appendix B.

15.4 A certificate of test and thorough examination must be issued by the competent person following the satisfactory completion of the test; the test certificate should state the maximum safe working load of the boom.

15.5 The test certificate should be endorsed with the information necessary to ensure that there is no ambiguity as to the configuration of the machine during the test.

16. Concrete pump examination

16.1 A concrete-placer boom is not an item of lifting equipment as defined in the Lifting Operations and Lifting Equipment Regulations 1998 (source of information: Health and Safety Executive).

16.2 An EC declaration of conformity must be issued by the manufacturer for each new concrete-placer boom supplied; a copy of this declaration or, where appropriate, a copy of the machine's test certificate, must be made available for viewing on the machine.

16.3 In accordance with the Provision and Use of Work Equipment Regulations 1998, a concrete-placer boom must be inspected "at suitable intervals to ensure that health and safety conditions are maintained and that any deterioration can be detected and remedied in good time".

16.4 A concrete-placer boom should be thoroughly examined at least once in a period of twelve months by a competent person who has the necessary knowledge and experience to carry out that duty.

16.5 A concrete-placer boom should be thoroughly examined by a competent person following substantial alteration or repair. The competent person may determine that a load test is appropriate to prove the alteration or repair.

16.6 A certificate of thorough examination should be issued following each thorough examination; a copy must be made available for viewing on the machine.

16.7 Certificates of test and thorough examination may be stored in any way appropriate to the owner of the machine, i.e. in paper format, electronically, etc.

16.8 The safe working load of the machine, i.e. the maximum length of delivery hose full of concrete to be suspended from the boom, should be clearly marked on the machine and shown on the certificates of test and thorough examination. Any other conditions, e.g. the deployment of stabilisers, must be noted on the certificate.

16.9 Following the thorough examination, a record of the examination should be retained at least until the next thorough examination. It is recommended that they be retained for a period of at least three years to prove a regular inspection regime.

16.10 A recommended thorough examination schedule is shown in Appendix A.

16.11 The manufacturer of the machine or the competent person appointed to examine it may specify a more frequent examination period because of the machine's age, its condition or its operating conditions, etc.

16.12 Inspections should be completed by the concrete pump operator, or another competent person, on a weekly basis at least and by mechanical staff carrying out routine services. A written record of the inspections must be retained and be available at all times for examination.

16.13 If a used concrete-placer boom is sold, the current certificate of thorough examination and its EC declaration of conformity (where applicable) should be supplied to the buyer.

17. Maintenance

As with all machinery, good maintenance of a concrete pump is paramount to safety. Road safety and on-site safety must both be considered when planning a maintenance system. A good defect reporting and repair system is also vital.

17.1 The concrete pump operator should carry out regular inspections of the machine to ensure that it is fit for use.

17.2 Any defect affecting vehicle safety in respect of Road Traffic Act requirements must be reported immediately to the maintenance department.

17.3 Any defect that, in the opinion of the concrete pump operator would affect the safe operation of the concrete-placer boom and its supporting structure should be recorded on the daily and weekly maintenance checklist and handed to a manager immediately.

17.4 Defects of a minor, non-safety related, nature should be recorded on the daily and weekly maintenance checklist. They should be recorded weekly until the defects have been repaired.

17.5 A programme of servicing the chassis, the boom and its supporting structure and the concrete pump should be devised as a part of a preventative maintenance system. The period between services may be determined by the manufacturer or the owner of the machine and may be based on mileage, the number of hours worked or a period of time.

17.6 The braking system should undergo at least an annual service.

17.7 Maintenance and service records should be retained to prove a regime of regular maintenance.

Figure 1
Concrete pump hire check list

1	Date of hire	
2	Name of contractor	
3	Address of site	
4	Insurance cover	
5	Boom size required	
6	Site visit required	
7	Site contact name	
8	Site telephone no.	
9	Concrete supplier & mix details	
10	Concrete supplier & telephone no.	
11	Time required on site	
12	M^3 of concrete to be pumped	
13	Special requirements • Linesman • Extra pipes/compressor/water supply • Spark arrester • Cash sale	
14	Provisional or confirmed booking	
15	Overhead power cables	
16	Order number	
17	Wash out area	
18	50kg of cement per 20m of pipeline for grout	
19	Risk assessment / method statement in place	
20	Type of pour - eg floor slab, wall, etc.	

Appendix A.
The thorough examination of concrete pumps

A thorough examination should include as a minimum (where applicable):

a. a visual inspection of all sections of the boom, its supporting structure, securing devices and stabilisers;
b. non-destructive testing of the structure and welds when it is deemed necessary by the competent person;
c. the opening up of concealed or encased parts to the extent required by the competent person;
d. measurement of backlash / play in the slewing system;
e. measurement of wear in the slewing rack thrust pad;
f. lift in the slewing ring;
g. the integrity of the slewing ring bolts;
h. measurement of wear in pins and bushes at the boom joints;
i. a check on the security of boom pins;
j. the condition of boom pipe brackets;
k. the presence of security pins in pipe couplings on the boom pipeline;
l. the condition of the boom tip safety chain and its anchorage;
m. the correct operation of lock valves on the boom's hydraulic rams;
n. the stabiliser locking system for both travelling and working;
o. the mounting fixtures for the pump sub-frame and the boom pedestal to the chassis;
p. the workings of levers and switches on the remote control box(es);
q. the condition of the remote control box lead;
r. the workings of manual control levers;
s. the operation of all emergency stop controls;
t. the clear marking of all controls;
u. the satisfactory operation of safety switches, e.g. slewing limits;
v. the operation of interlock systems, e.g. on the receiving hopper;
w. the integrity of the receiving hopper grille;
x. the guarding of the concrete pump cylinders' flushing box;
y. the guarding of the machine's prop-shaft;
z. the condition of the machine steps and walkway;
aa. the condition of the washing-out adaptor and the sponge cleaning ball catcher;
bb. working lights;
cc. appropriate warning signs;
dd. the manufacturer's identification plates.

Appendix B.
The safe load testing of a concrete-placer boom

1 The objective of testing a concrete-placer boom is to demonstrate that it is structurally sound and fit for the use for which it was designed.

2 In the event of any alteration or repair that may affect the stability of the machine then stability tests should be carried as specified by the manufacturer for the particular type and configuration of machine.

3 The competent person should be satisfied that the test is carried out in accordance with the manufacturer's schedule.

4 The machine should be thoroughly examined by a competent person before load testing is carried out to ensure that defects in the structural integrity do not exist. Any structural defects found must be repaired before the machine is load tested.

5 A functional test without a load imposed to ensure the correct function of all controls should be made.

6 The ground for the test site should be well consolidated and capable of withstanding the loads that will be applied to it; a greater load will be imposed on the ground during an overload test than in normal pumping operations. Care should be taken to ensure that there are no hidden dangers such as cable ducts, drains, pipes, back-filled areas, cellars or other subterranean weaknesses.

7 Concrete-placer booms should not be tested in the vicinity of overhead power lines.

8 The ground should be level to within the limits specified by the manufacturer of the machine.

9 The limitation on wind speed for testing of the boom may be lower than the limitation for normal operation and, in cases of doubt, the designer's or another competent engineer's advice should be obtained.

10 The site should be of sufficient area and have unrestricted overhead clearance to allow the unobstructed movement of the concrete-placer boom and the test weights throughout the appropriate test movements.

11 Testing should not be carried out over high-risk areas such as a public highway, railway or occupied buildings.

12 If a boom is required to slew over a public highway during a test, the appropriate Local Authorities should be contacted to arrange convenient times and dates and, where necessary, diversion of traffic and pedestrians during the tests.

13 The boom must never be slewed over a railway line or river.

14 The outriggers should be fully deployed in accordance with the manufacturer's instructions.

15 The test weights should represent a 25% increase on the safe working load stipulated by the manufacturer.

16 The test weights should be kept no more than 200 mm. above the ground at all times.

17 Load testing is designed to prove the strength of a concrete-placer boom; it should be borne in mind that it might not withstand the loading imposed. Therefore, all personnel involved with the test should be positioned where they are unlikely to be injured should the boom fail. The test area should be roped off and notices posted prohibiting unauthorised entry.

18 The site should be clear of plant and property that may inhibit the test.

19 Load testing should not be carried out in weather conditions likely to affect the safety of the machine, e.g. wind speeds in excess of those specified in the operating instructions for the machine.

20 Tyre pressures may be a critical factor in the stability of a mobile concrete pump; tyre pressures should be checked against the information contained in the manufacturer's handbook. The tyres of a mobile concrete pump under test should be as specified by the manufacturer, in good condition and free from serious defects.

21 The test weights should be of proven accuracy to within ± 1.0%.

22 The weight of the lifting accessories should be included as part of the test load.

23 After the test, a thorough examination should be carried out by a competent person to ensure that the machine has withstood the test loadings without signs of structural damage that will affect the safe working of the boom, such as:

- cracking;
- permanent deformation;
- paint flaking;
- loosening of or damage to structural connections.

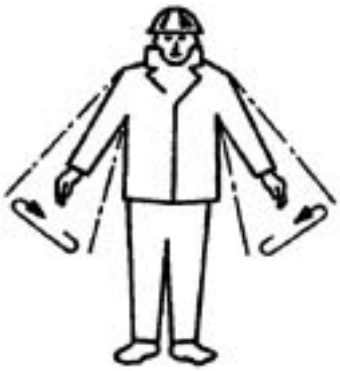
Appendix C
Recommended signals

Start pumping

Stop pumping

Emergency stop

Raise the boom

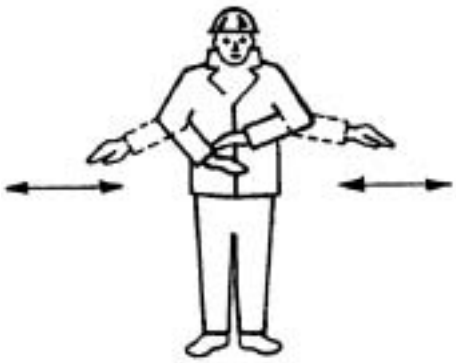


Lower the boom slowly

Lower the boom

Slew left

Slew right



End of pour

CPA. 27/28 Newbury Street, Barbican, London EC1A 7HU.
Tel: 020 7796 3366. Fax: 020 7796 3399.
Email: enquiries@cpa.uk.net
Website: www.cpa.uk.net