

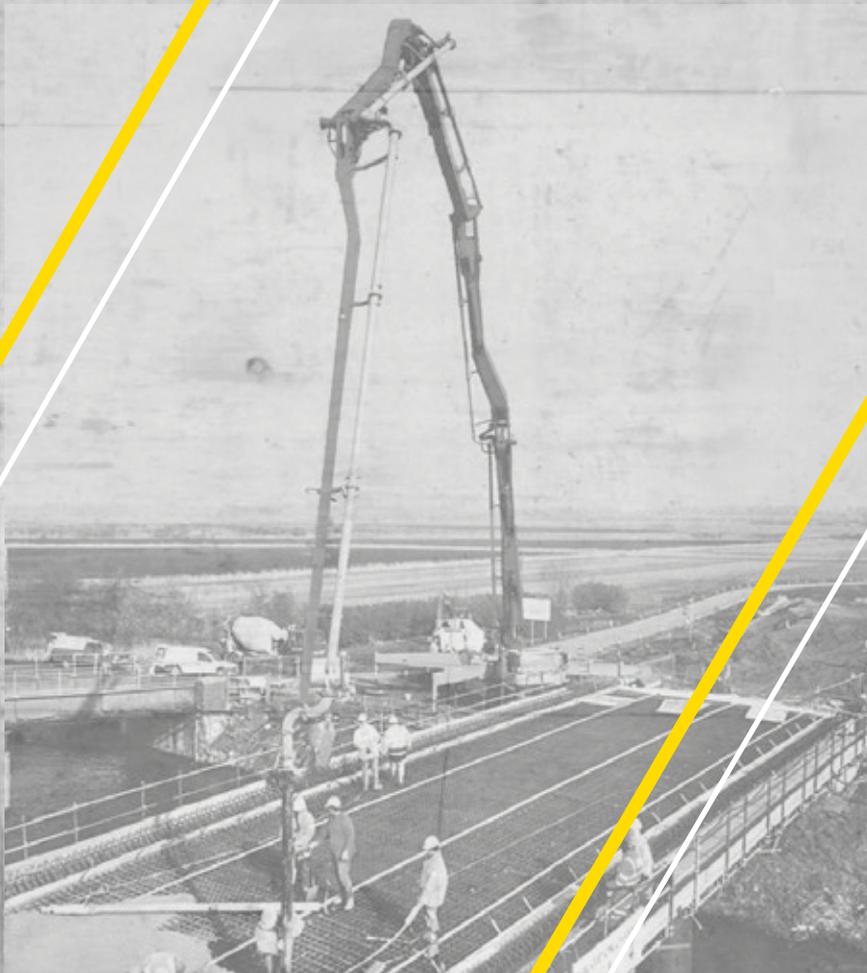


HEALTH AND SAFETY  
AUTHORITY

# Guidance on Safety in **Concrete Pumping**



**Our Vision:  
healthy, safe and  
productive lives**



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### 1.0 INTRODUCTION

The aim of this guidance is to improve standards of safety during concrete pumping and reduce the incidence of collapse of concrete pump rigs and injuries due to incidents involving pressurisation of pipework or other equipment. It should be read in conjunction with the relevant legislation and guidance outlined in Annex 8.

Practical guidance is provided as to the observance of the Safety, Health and Welfare at Work Act 2005, the provisions of the Safety, Health and Welfare at Work (General Application) Regulations 2007 to 2016 and the Safety, Health and Welfare at Work (Construction) Regulations 2013 (S.I. 291 of 2013).

As with all construction equipment, the safe operation of concrete pumps depends on a number of factors including the selection and maintenance of the pump and placing boom, the planning and supervision of their use and the competence of the operator and other personnel. If any of these are deficient, the risk of a serious accident increases significantly, so it is essential that site managers ensure that all concrete pumping operations are planned, supervised and carried out safely.

This guidance has been prepared by the Health and Safety Authority (HSA) in consultation with the Construction Safety Partnership Advisory Committee (CSPAC), an advisory committee to the Board of the HSA. Recommendations are outlined for the safe use of truck-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.

The detailed design of the concrete pump is subject to the Machinery Directive 2006/42/EC and associated Irish legislation the European Communities (Machinery) Regulations, 2008 [S.I.No.407 of 2008]. In addition, the Irish Standard I.S. EN 12001 deals specifically with concrete pumps and is available from the National Standards Authority of Ireland (NSAI). Compliance with this standard gives a presumption of compliance with the Machinery Directive for aspects covered in the standard.

In preparing this guidance, the use of material from the British Construction Plant-Hire Association's publication "Safe Use of Concrete Pumps" is gratefully acknowledged.

## 2.0 DEFINITIONS

For the purposes of this guidance, the following definitions apply:

- 2.1 Additive:** A material which is added to concrete to change the properties of the mix.
- 2.2 Ball Catcher:** a device fitted to the delivery end of a pipeline designed to catch the sponge rubber device used for cleaning the pipeline.
- 2.3 Banksman:** A person who is competent to give directions to the operator of a vehicle- mounted concrete pump during manoeuvring of the vehicle on site by a recognised code of signals or by verbal communication.
- 2.4 Blanking device:** A component designed by the concrete pump manufacturer fitted securely at the outlet end of a placing or delivery hose with a coupling or other device to prevent concrete from falling out of the hose whilst the concrete placing boom is being moved to a new position.
- 2.5 Boom Tip Safety Chain:** A chain fitted to the end of the concrete placing 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.

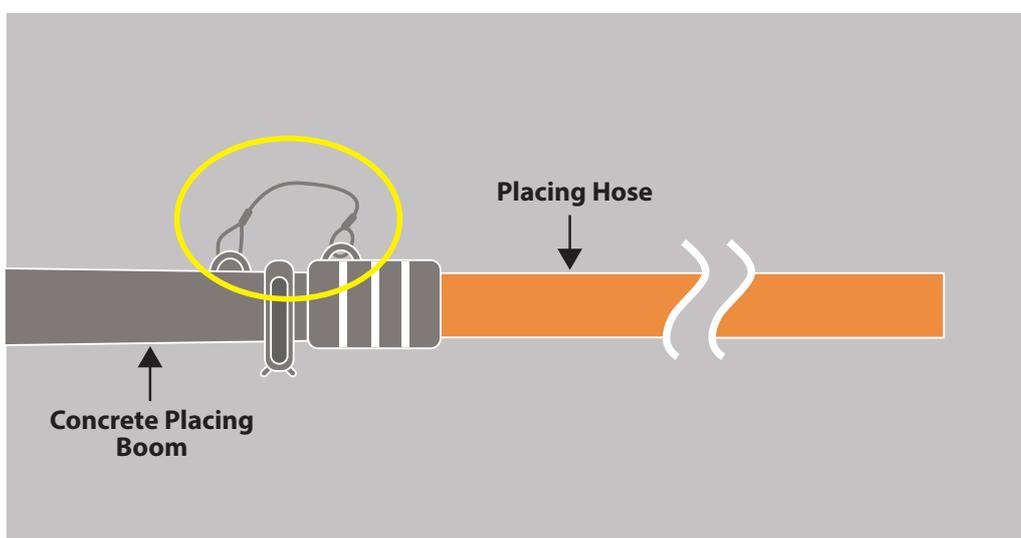


Fig 1: Safety Chain Circled in Yellow

- 2.6 Competent Person:** A person who has such knowledge, experience and training as necessary to safely carry out the functions to enable him/ her to carry out his/her duties having regard to the task he or she is required to perform.
- 2.7 Concrete:** A homogenous mix of cement, graded aggregate and water, to which additives may be added.

## 2.0 Definitions (Cont'd)

- 2.8 Concrete Placing Boom:** A device to support and position the delivery pipeline. It can incorporate folding, derricking and slewing motions.



Fig 2: Concrete Placing Boom

- 2.9 Concrete Pump:** 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 placing boom.



Fig 3: Truck Mounted Concrete Pump with Boom and Pipeline

- 2.10 Delivery Hose:** A flexible hose used in the pipeline other than as a placing hose, i.e. a double ended hose.
- 2.11 Hirer:** Company, firm, person, corporation or public authority taking the Owner's plant on hire, including their successors or personal representatives.
- 2.12 Inspection Report:** A document containing the results of an inspection of the concrete pump by a competent person and including the details specified in Annex 6.
- 2.13 Linesman:** Person supplied by Owner or Hirer trained to work with concrete delivery pipelines.
- 2.14 Owner:** Company, firm or person letting the concrete pump on hire, including their successors, assignees or personal representatives.
- 2.15 Pipelines or Delivery Lines:** Pipes, whether steel or rubber, through which the concrete is conveyed. They will include, pipes, bends, hoses, coupling connectors and any valves inserted in the line.
- 2.16 Placing Hose:** A flexible hose to provide freedom of movement in the final placing of concrete.



Fig 4: Section of Delivery Pipeline

- 2.17 Receiving Hopper:** The area into which the mixed concrete is discharged prior to being pumped into position.
- 2.18 Remote Control Box:** 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 placing boom movements, the concrete pump and the vehicle engine.
- 2.19 Safety Induction Training:** Instruction given to the Hirer to communicate, for example, the site safety rules, safe access on the site and the location of welfare facilities.
- 2.20 Signaller:** 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 Sponge Rubber Cleaning Device:** 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.
- 2.22 Stabilisers:** Extendable structural members on the pump unit to increase the dimensions of the stability base.
- 2.23 Trailer-mounted Concrete Pump:** A concrete pump mounted on a trailer that can be towed (also known as a static pump).
- 2.24 Truck-mounted Concrete Pump:** A concrete pump mounted on a self-propelled lorry (see Fig 3 above).
- 2.25 Wash Out Adapter:** 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(s) should be fitted for releasing the pressure when necessary in addition to a working pressure gauge.

## 3.0 Selection of Personnel

### 3.0 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 or drugs. The HSA has issued a guidance note [“Intoxicants at Work”](#) to assist employers and workers deal with issues surrounding alcohol and drugs in the workplace.

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 18 years of age if driving a concrete pump on the road. If driving a concrete pump on the road, the operator must fulfil all necessary requirements under road safety legislation;
- c.** have adequate communication skills;
- d.** be medically and physically fit, with particular regard to eyesight, hearing and reflexes (see 3.2);
- e.** be physically able to operate the concrete pump safely;
- f.** be able to judge distances, heights and clearances;
- g.** be adequately trained for the class of concrete pump which he operates (see 2.6);
- h.** have sufficient knowledge of the machine and its safety devices;
- i.** be fully conversant with the duties of the signaller and should understand the signals code agreed with him;
- j.** be authorised to operate the machine; and
- k.** in the case of a mobile concrete pump operator expected to move the pump, be qualified to drive a large goods vehicle (Class C).

### 3.1 Medical Fitness

Employers have a duty to both ensure the health of their employees and to ensure that any employee is fit to undertake the tasks they are required to carry out.

### 3.2 Signaller Requirements

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 placing boom; and
- c.** give clear and precise verbal instructions where audio equipment is used, for example, a two-way radio.

### 4.0 TRAINING AND CERTIFICATION

**NOTE:** Section 8 of the Safety, Health & Welfare at Work Act 2005 requires the employer to provide “the information, instruction, training and supervision necessary to ensure, so far as is reasonably practicable, the safety, health, and welfare at work of his or her employees”.

#### 4.1 Training Syllabus

The training of the concrete pump operator should include:

- a.** safety awareness,
- b.** knowledge of the employer’s risk assessments and site risk assessments,
- c.** knowledge and use of any personal protective equipment (PPE) provided,
- d.** pre-driving checks,
- e.** necessary daily and weekly checks and maintenance of the machine,
- f.** safe siting, rigging and de-rigging of the concrete pump in accordance with the manufacturer’s instructions in site conditions,
- g.** operating the concrete placing boom safely,
- h.** operating the concrete pump,
- i.** cleaning the concrete pump out,
- j.** working with delivery lines,
- k.** basic knowledge of concrete composition,
- l.** awareness of the dangers of compressed air,
- m.** working adjacent to overhead power lines,
- n.** dealing with emergency situations,
- o.** working with blockages,
- p.** personal health and safety considerations,
- q.** driving the lorry, if applicable, and
- r.** documentation in relation to the job.

## 4.0 Training and Certification

### 4.2 Training Standards

One method of helping to ensure that a concrete pump operator is adequately trained is to ensure that the operator is trained in, and qualifies from, an internationally recognised scheme incorporating these elements (as set out above).

### 4.3 Periodic Assessment

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

### 4.4 Transfer to a Different Machine

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

### 4.5 Supervision During Training

Personnel undergoing training should be appropriately supervised.

### 4.6 Proof of Training

The concrete pump operator or his employer should always be able to show the Owner or site management proof of training.

### 4.7 Additional Training

The appointed signaller and operator should be instructed on:

- a.** the use of the code of signals in Annex 4,
- b.** the use of any communications device supplied, and
- c.** any special risks on the site, for example, overhead obstructions.

### 5.0 MANAGEMENT OF THE CONCRETE PUMPING OPERATION

All concrete pumping pours should be planned to ensure that they are completed safely and that all significant 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 to and from one location this planning may only be necessary in the first instance, with periodic reviews to ensure that no factors have changed.

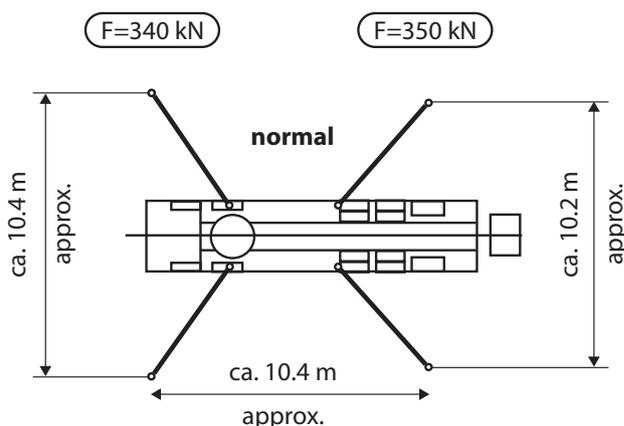
#### 5.1 Machine Risk Assessment

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

#### 5.2 Information for the Hirer

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

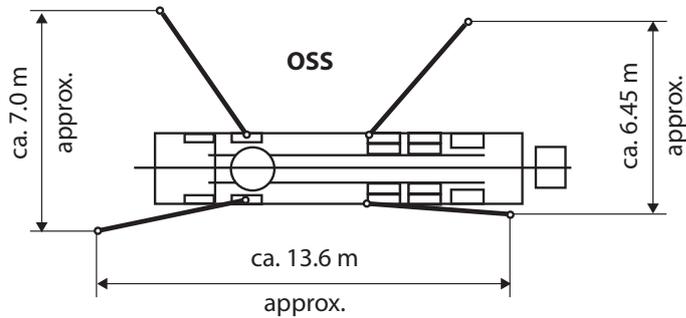
- the maximum reach of each concrete placing boom, both horizontally and vertically,
- the standard equipment carried on a truck-mounted concrete pump,
- the weights of pipeline, placement hoses, delivery hoses and accessories,
- the maximum likely loadings for each of the stabiliser bases,
- the footprint of the machine with all stabilisers extended in accordance with the manufacturer's instructions for the specific machine,



**NOTE:** Short rigging is the term given to a situation where stabilisers cannot be fully deployed due to constraints such as space or inadequate ground support. Short rigging must only be undertaken on machines specifically equipped with the appropriate safety systems.

Fig 5: Plan Sketch of Typical Loading – All Stabilisers Extended Fully

## 5.0 Management of the Concrete Pumping Operation (Cont'd)



**NOTE:** The maximum pressure generated by the pump will depend on the delivery situation and other factors. This should be the subject of discussion between the Owner and Hirer.

Fig 6: Plan Sketch of Typical Loading – Short Rigging or OSS (One Sided Support)

- f. the boom configuration, and
- g. the maximum safe wind speed for the operation of the boom.

### 5.3 Concrete Pump Hire Checklist

The Hirer should make reference to a concrete pump hire checklist ([see Annex 1](#)) to assist the Owner to provide the correct machine for the job.

### 5.4 Safe System of Work

Following a site specific risk assessment, a safe system of work should be established by the Hirer and this should be followed for every concrete pumping operation whether it is an individual pour or a series of pours.

The safe system of work should cover arrangements for all aspects of work from the concrete pumping rigs arrival to its departure, including:

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

## 6.0 Selection of Concrete Pump Rigs Before Deployment

### 6.0 SELECTION OF CONCRETE PUMP RIGS BEFORE DEPLOYMENT

#### 6.1 Size and Pumping Capacity

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 Documentation

When the rig arrives at site the following documentation should be available prior to the start of the pumping operation:

- Inspection Report – we recommend that the concrete pump be inspected at least annually and the information set out in appendix 3 be recorded during these inspections and be made available in the form of an inspection report.
- Declaration of Conformity if less than 12 months old or if the pump has undergone a substantial alteration in the past 12 months.
- Evidence of operator training.
- Evidence of pre-delivery checks.
- Daily /weekly check sheets.

Evidence of the Roadworthiness Inspection Sheets should be supplied if requested.

### 6.3 Hirer's Responsibilities

Responsibilities of the Hirer in requesting a suitable concrete pump should include:

- access to and egress from the site suitable for the size of the machine;
  - sufficient area for the machine's stabilisers to be safely deployed;
  - the ability of the ground to support the loads likely to be imposed by the machine's stabilisers;
  - taking account of underground restrictions, for example cellars under pavements or cables close to the surface;
  - overhead obstructions, for example power-lines and structures; it is the Hirer's responsibility to devise a safe method of working in the vicinity of overhead power-lines;
  - assess the reach of the boom to the most remote point of the concrete pour;
- NOTE:** *In the case of truck-mounted pumps, consideration ought to be given to the optimum concrete placing boom size for site conditions. Correct selection of the concrete placing boom will reduce safety risks.*
- suitable access for the ready-mixed concrete truck to the receiving hopper of the concrete pump;
  - the need for a signaller in circumstances where the operator will not be able to see the delivery end of the pipe-line or hopper;
  - adequate protection of the permanent works from potential damage by the concrete placing boom;
  - any special operational requirements or limitations imposed;
  - the need for additional delivery pipeline to supplement the boom pipeline;
  - the need for properly designed support for the additional pipe-line;
  - the need for the Hirer to maintain any Hirer-owned pipeline, for which the concrete pump Owner has no responsibility; and
  - the conditions of hire.

### 6.4 Machine Selection

The concrete pump Owner should select the machine and operator to be sent to a site on the basis of:

- information provided in item 6.3 above,
- the distances to be driven to and from the site by the operator to reduce the road safety risk element,
- the hours worked by the operators on the previous day and the estimated rest period between their jobs, and
- the need for additional labour such as for pipeline work.

### 7.0 TRAVELLING TO AND FROM THE SITE (TRUCK-MOUNTED CONCRETE PUMP RIGS)

#### 7.1 Place of Work

Employers and employees should consider the journey in a truck-mounted concrete pump to and from the site to be part of the work process.

#### 7.2 Planning Journey Time

Sufficient time should be allocated by the employer to allow the concrete pump operator to drive to the site safely taking account of speed limits, potential traffic and other obstacles.

#### 7.3 Pre-Journey Checks

The employer should allocate sufficient time to ensure that the concrete pump is safe for the road, for example by allowing sufficient time for checking the function of the lorry's lights and other essential pre-driving checks.

#### 7.4 Behaviour on the Road

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.

#### 7.5 Trailer-mounted Concrete Pumps

The delivery, loading/unloading and collection of trailer-mounted concrete pumps and additional placing equipment should be adequately planned between the Hirer and the Owner.

### 8.0 ARRIVAL ON SITE AND SETTING UP THE MACHINE

#### 8.1 General

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

#### 8.2 On Arrival

On arrival, the concrete pump operator must report to the site office.

#### 8.3 Site Induction

The concrete pump operator must attend site safety induction training as required by the Project Supervisor for the Construction Stage (PSCS). 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.

#### 8.4 Authorised Access Routes

It is the Hirer's responsibility to assess the ground conditions and confirm its suitability to support the lorry-mounted concrete pump. Reference Information provided in item 6.3 above. The concrete pump operator should only use authorised routes across the site. Where possible, site routes should be taken to eliminate reversing. Where this is not possible, the Hirer/contractor should supply a banksman to assist with reversing when necessary. The use of CCTV cameras and other visual aids should be considered to reduce the risk of collisions.

#### 8.5 Siting the Machine

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 and the working position of the concrete pump operator. This requirement should be confirmed to the concrete pump operator on site during a pre-start briefing. Underground voids, for example new drainage trenches and manholes, should be avoided when determining the positions of stabilisers.

## 8.0 Arrival on Site and Setting Up the Machine (Cont'd)

### 8.6 Overhead Power Lines

Overhead power-lines must be considered when setting up the machine; the boom must never be positioned where it might touch overhead lines 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.

**NOTE:** Further guidance is given in *ESB Code of Practice for Avoiding Danger from Overhead Lines approved by the HSA*, available at [www.hsa.ie](http://www.hsa.ie).

### 8.7 Proximity of Cranes and Other High Reach Equipment

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

### 8.8 Maximum Operating Wind Speed

The manufacturer of the machine specifies the maximum wind speed in which it is safe to operate a concrete placing boom. The pump Owner must supply this information to the Hirer. 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.

### 8.9 Use of Stabilisers

#### 8.9.1 Manufacturer's Instructions

All stabilisers must be deployed in accordance with the manufacturer's instructions. Where appropriate, sole-plates should be used under the stabiliser base plates to spread the loading from the machine.

#### 8.9.2 Sole or Spreader Plates

All sole-plates must be of adequate strength and size to support and distribute the loads likely to be applied.

#### 8.9.3 Responsibility for Ground Conditions

It is the responsibility of the Hirer 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. If the concrete pump operator is concerned about suitability of the ground conditions they should consult the Hirer and their manager before proceeding with operations.

#### 8.9.4 Stabiliser Loading Information

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

## 8.0 Arrival on Site and Setting Up the Machine (Cont'd)

### 8.10 Pre-use Checks

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

### 8.11 Guards

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

### 8.12 Pipelines

Pipelines for conveying concrete from the pump to the pour position may be supplied and set up in a number of ways:

1. For basic single pours where the distance from the pump to the pour point does not exceed approximately 30m, the Owner will generally send the pump, operator and standard pipeline equipment to site. The operator sets the pipeline up, with assistance from site, carries out the pour and removes the equipment from site.
2. For basic single pours where the distance from the pump to the pour point exceeds approximately 30m, the Owner will generally send the pump and operator to site with a second person (linesman) and a vehicle containing the pipeline equipment. The operator and linesman set the pipeline up with assistance from site personnel and carry out the pour. After the pour, the equipment and pipeline is removed from site.
3. For multiple pours, the pipeline is normally delivered to site and set up beforehand, remaining on site until the pours have been completed. The pipeline can either be set up by Owner's personnel or the Hirer's personnel. The concrete pump will then come to site with the operator, and possibly a linesman, to carry out each pour. It is essential that responsibility for the pipeline is agreed between the Owner and Hirer.
4. On large contracts the Hirer may choose to supply their own pipeline which they will set up themselves and maintain. The Owner will then send the pump to site as required whilst the Hirer takes full responsibility for the pipeline.

Whichever method of supply and set up is used, it is essential that the operation is planned effectively and that each element of the line must be capable of resisting the likely maximum pressure exerted by the concrete pump. The installation should be inspected by a competent person before being taken into use, to ensure that it is safe. This inspection should include checks that all couplings have been fitted with gaskets and safety pins, and that flexible hoses have not been used in place of steel bends.

### 9.0 DURING THE POUR



#### 9.1 General

If, in the opinion of the concrete pump operator, there is a risk of injury, damage to property or the machine, the operation must cease immediately and consultation with the Hirer sought without delay.

#### 9.2 Control of Noise

The combination of the noise levels from different items of plant may exceed the action levels in the Safety, Health & Welfare at Work (General Application) Regulations 2007, Chapter 1 of Part 5: Control of Noise at Work. If this excess noise level cannot be eliminated or reduced to a safe level, the concrete pump operator should be supplied with appropriate ear defenders and be instructed on the use of them in accordance with the Regulations.

If operators are exposed to daily noise levels of 80 decibels (dBs) or any instantaneous exposures of 135 dBs, his employer must make available to them preventive audiometric testing. If operators are exposed to daily noise levels of 85 dBs or any instantaneous exposures of 137 dBs exposures or equivalent, they must be offered by their employers the services of a registered medical practitioner to carry out hearing checks and audiometric testing. See the [HSA Guidelines on Hearing Checks and Audiometry](#).

### 9.3 Remote Controls

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.

When a remote control box is in use, any other controls on the machine must be effectively isolated.

### 9.4 Use of Signallers

#### 9.4.1 Requirement for Signallers

If the concrete pump operator is required to position himself where he cannot see the concrete placing gang, the Hirer must supply a signaller to give appropriate signals to the concrete pump operator (see Annex 4).

#### 9.4.2 Signal Code

A code of signals must be agreed between the concrete pump operator and a representative of the concrete placing gang before pumping starts (see Annex 4).

#### 9.4.3 Concrete Level Monitor

When the concrete pump operator cannot see the concrete level in the machine's receiving hopper, it is the responsibility of the concrete pump supplier to arrange a competent person 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.

In certain situations it might be feasible to have mutual arrangements between drivers to check the level of concrete in the hoppers. However, this must be agreed prior to commencing work and must be facilitated by the nature of the pour.

#### 9.4.4 Responding to Signals

The concrete pump operator should at any one time respond only to the signals from the appointed signaller, who should be clearly identified. The concrete pump operator must respond immediately to signals given by a signaller.

## 9.0 During the Pour (Cont'd)

### 9.5 Personnel in the Vicinity of the Concrete Pump

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

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.

### 9.6 Pipeline Blockages

Clearing pipeline blockages is a potentially hazardous task, as workable concrete has such a short life. If a blockage is detected, then it's vital that it be cleared as quickly as possible. A clear risk assessment and robust method statement setting out roles and responsibilities should be in place to minimise the possibility of accidents.

All personnel dealing with the pipeline should be trained in what to do in the event of blockages. Whilst the concrete pump operator may be the person on site with the most experience of clearing blockages, it is unreasonable to expect him to have control over a long pipeline. It is important to remember that overall responsibility for the management of the operation will rest with the Hirer.

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, for example by reversing the pumping action. The pipeline must be treated as being pressurised at all times. Appropriate and adequate hand and eye protection must be worn when opening the delivery pipeline.

The Hirer/ (sub) contractor should ensure that site personnel **DO NOT** under any circumstance open or attempt to open the delivery pipeline under pressure.

Where a blockage has to be cleared the following procedure should be followed:

- Stop pumping immediately
- Reverse the pump until the pressure is released (**DO NOT** increase the pressure to clear the blockage as an alternative to the following procedure)
- Locate area of blockage, check the following:
  - o reducer (if applicable),
  - o bends,
  - o flexible rubber hoses, and
  - o outlet of pump.
- Establish an exclusion zone (move non-essential personnel out of the area)
- Refer to 10.9a, 10.9b & 10.9n for additional requirements
- Disconnect the delivery pipeline at the safest point near to the blockage
- Clean out the blockage, re-prime and re-connect ensuring that safety pins and clips are in place
- Recommence pumping operation to ensure blockage is clear, if not repeat the procedure as above

**NOTE:** It is essential that the manufacturer's instructions or guidance on blockage clearing is followed in all situations.

### 9.7 Concrete Placing Gang Training

The Hirer/ (sub) contractor should ensure that members of the concrete-placing gang/ linesman are adequately trained in the safe placing of concrete. In particular, they should be aware of the risks associated with the use of placement hoses such as hose whipping.

### 9.8 Exhaust Fumes

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

### 9.9 Leaving the Concrete Pump Unattended

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

### 9.10 Maximum Hose Length

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 as this may affect the strength and/or stability of the pump unit.

### 9.11 Falling Concrete

Concrete must be prevented from falling out of the delivery hose when the boom is being manoeuvred over personnel or property. Where necessary, a Blanking Device, fitted in accordance with the manufacturer's instructions, should be used.

**NOTE:** In using such Blanking Devices care must be taken to ensure that additional hazards are not introduced.

### 9.12 Use of Concrete Placing Boom as a Crane

The boom must **never** be used as a means of hoisting/lifting equipment or personnel.

### 9.13 Securing Pins

Purpose designed securing pins must be fitted to all pipe couplings to prevent them from opening accidentally.

The tip hose should also be fitted with safety straps/chains to prevent the hose falling in the event of pin failure.



Fig 7: Coupling with Securing Pin

## 9.0 During the Pour (Cont'd)

### 9.14 Hopper

The hopper contains 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. The interlock, a switch usually located at the hopper grille, prevents operation of the machine when dangerous moving parts inside the hopper can be accessed. The hopper grille must be in a closed position at all times during the pumping operation.

### 9.15 Movement of Lorry-mounted Concrete Pumps on Site

#### 9.15.1 Travelling Configuration

If the lorry-mounted concrete pump has to be moved on site, the boom must always be folded to the travelling position. The only exception to this recommendation would be a procedure laid down by the machine manufacturer that allows otherwise. Any procedure endorsed by the equipment manufacturer should be strictly adhered to as laid down in their operating instructions, as the risk of the machine turning over is greatly increased. However, the safest and accepted procedure is to return the boom to its folded travelling position whenever the machine is to be moved.

#### 9.15.2 Site Traffic Management Arrangements

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

### 9.16 Washing Out of Ready-mix Truck Chutes

Site managers should ensure that ready-mixed concrete trucks do not wash out their chutes into the receiving hopper of the concrete pump. This can cause damage to the pump unit and affect concrete quality. Washing out arrangements should be agreed between site management and ready-mix concrete suppliers.

## 10.0 WORK WITH PIPELINES

### 10.1 Resources

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

### 10.2 Selection of Equipment

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

**NOTE:** *The maximum pressure generated by the pump will depend on the delivery situation and other factors. This should be the subject of discussion between the Owner and Hirer.*

### 10.3 Inspection

The concrete pump operator/Hirer should carry out regular inspections of the standard delivery pipeline supplied with the machine, in accordance with a planned maintenance schedule to ensure that they are fit for continued use. Recommendations for inspections are given in Annex 2.

**NOTE:** *The inspection of additional pipeline, beyond the standard pipeline supplied with the machine, is the responsibility of the Hirer.*

### 10.4 Setup of Pipelines

The setting up of all pipelines, not supported by the machine, should be under the direction and control of the Hirer.

### 10.5 Pipeline Support

All pipelines must be adequately supported.

### 10.6 Couplings

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.

## 10.0 Work with Pipelines (Cont'd)

### 10.7 Pipelines Fitted to Scaffolding

#### 10.7.1 Loadings and Attachment

Before a pipeline is fitted to a scaffold/falsework, the Hirer must confirm that the scaffolding/falsework 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/falsework.

#### 10.7.2 Working Platforms

Working platforms, in compliance with the Safety, Health and Welfare at Work (General Application) Regulations 2007 Part 4 Work at Height, must be provided for the purpose of attaching pipelines to scaffolding.

### 10.8 Protection of Delivery Lines

Where personnel and/or vehicles are required to pass over delivery lines, suitable ramps should be provided.

### 10.9 Cleaning Delivery Lines Using Compressed Air

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 or when the concrete pump has broken down. It may be necessary in these circumstances to use compressed air.

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.

- 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 suitable grade and bearing a CE mark.
- 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.
- All flexible hoses must be removed from the pipeline.  
**NOTE:** *This does not apply to ground hoses used in piling operations.*
- The pipeline must be fully supported and secure.
- There must not be any bends in the final 15 metres of the pipeline, unless the pipeline is adequately secured.
- A sponge wash out ball should be inserted into the pipeline at the end from which the pipeline is to be blown out.

- The washout adapter should be attached to the end of the pipeline using a coupling, rubber seal and securing pin. The air entry and emergency pressure release valves must be checked to ensure that they work correctly.
- A ball-catcher attachment must be fitted to the discharge end of the pipeline to catch the sponge wash out ball, which could otherwise be expelled with great force.
- The air line from the compressor should then be attached to the air entry control valve on the washout adapter.
- The compressed air should be introduced gradually, sufficient only to move the sponge rubber cleaning device steadily along the pipeline.
- 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.

**WARNING: The assistant should stay away from the end of the delivery line.**

- 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.  
**NOTE:** A way of achieving this is to shut off the flow of air altogether as the assistant approaches the final 25% of the delivery line.
- Air must be exhausted via the emergency valve whenever the speed of the discharge of concrete becomes too rapid.
- 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 (see Section 9.7).

To clean delivery lines safely using compressed air the following equipment is required:

- A wash out adapter, designed for the purpose and equipped with an air entry control valve and an emergency pressure release valve.
- Sponge wash out balls.
- A ball-catcher attachment.
- A compressor not delivering more than 7 bar pressure.

## 11.0 Pumping Special Types of Concrete

### 11.0 PUMPING SPECIAL TYPES OF CONCRETE

#### 11.1 General

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 placing boom and for the concrete pump operator.

#### 11.2 Effects of Additives

The effects of chemicals added to the concrete must be considered by the Hirer and the concrete supplier, both in terms of health effects and the effects on the pump ability of the concrete mix. Most additives are water-based and are non-hazardous or irritants. A small group have a high pH and are therefore harmful, this particularly applies to some water-resisting additives and sprayed concrete accelerators. A few, accelerators and corrosion inhibitors, may be toxic.

The Hirer should obtain safety data sheets for the additives used from the additive supplier. He should also talk to the additive supplier about the combining of any additives in the concrete and obtain advice on appropriate precautions to be taken. All precautions as required by the safety data sheets and as advised by the additives supplier should be facilitated and enforced. Information on the additive which is relevant to health and safety must be given to the client by the supplier.

Additional information can be obtained from the Irish Concrete Federation and the UK Concrete Society and the Concrete Society's publication "TR18 A Guide to the Selection of Admixtures for Concrete".

#### 11.3 Risks to Health

The employer 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.

#### 11.4 Concrete Density

The density of special concretes should be considered, especially when pumping through a boom. When very heavyweight concrete, that containing heavy natural aggregates such as barites or magnetite or manufactured aggregates such as iron or lead shot, is to be pumped, the concrete pump boom manufacturer's recommendations must be considered.

#### 11.5 Foamed and Air-entrained Concrete

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.

## 12.0 CLEANING OUT THE MACHINE

### 12.1 General

Cleaning out a concrete pump and its concrete placing boom is a specialist operation, which is to be left to the concrete pump operator. If the concrete pump operator requires assistance when cleaning out the delivery line, this must be carried out under supervision.

### 12.2 Water Supply

Truck-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. Trailer or skid-mounted concrete pumps need a separate water supply or bowser.

### 12.3 Designated Washout Areas

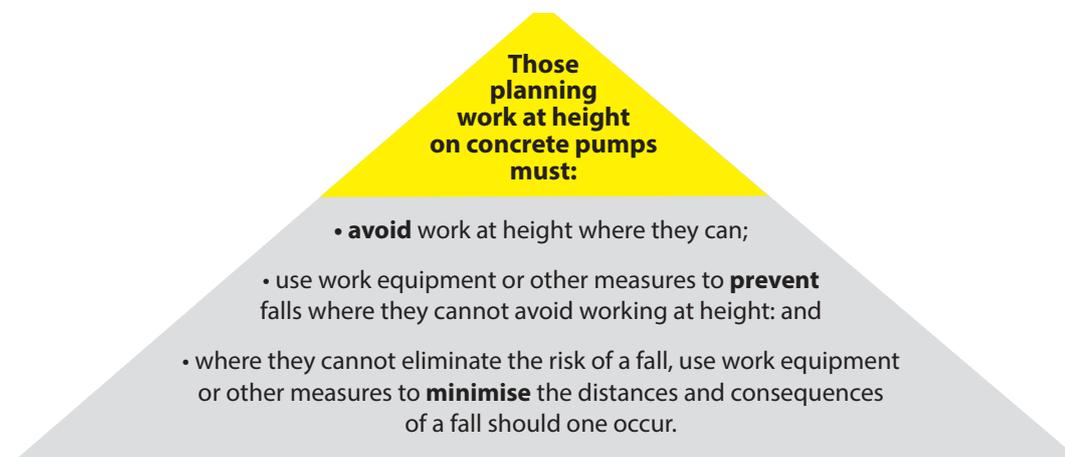
The cleaning process involves the deposit of some waste concrete on the site. The concrete pump must only be washed out in the area designated by the Hirer.

### 12.4 Isolating the Pump

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

### 12.5 Working at Height

When considering the risk of working at height during the cleaning process, the hierarchy of control should be followed.



## 12.0 Cleaning out the Machine (Cont'd)

### 12.5.1 Hierarchy of Measures

- a.** Avoid work at height wherever possible and actively seek solutions to facilitate this.
- b.** If this is not possible, use “collective” means of prevention such as guardrails.
- c.** If this is not possible, use “personal” means of prevention such as work restraint.
- d.** If this is not possible, use “collective” means of protection such as air bags or nets.
- e.** If this is not possible, use a personal fall protection system such as a work positioning system or fall arrest system.

### 12.5.2 Training

All persons working at height must be trained to ensure that they are competent to work at height and are able to use any equipment such as personal fall protection systems safely.

### 12.5.3 Selection of Personal Fall Protection Equipment

Where a risk assessment indicates that a personal fall protection system is required, a working positioning system should always be used in preference to a fall arrest system. Where the use of fall arrest personal fall protection systems is unavoidable, there will be a risk of the wearer being left suspended following a fall and arrangements must be made to ensure that they can be rescued in a safe and timely manner.

### 13.0 LEAVING THE SITE (TRUCK-MOUNTED PUMPS)

#### 13.1 Stowing

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

#### 13.2 Emptying the Receiving Hopper

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

#### 13.3 Checking of Tyres

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

## 14.0 Personal Protective Equipment (PPE)

### 14.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)

#### 14.1 General

The concrete pump operator is likely to be exposed to a variety of working conditions where the wearing of personal protective equipment (PPE) will be required. The Safety, Health and Welfare at Work (General Application) Regulations 2007 Part 2 Chapter 3 covers use of PPE at work. The actual PPE itself must comply with the relevant European PPE Directive/Regulations and associated Irish PPE Regulations.

#### 14.2 Appropriate PPE

Depending on the circumstances and the risk assessment in operation, the PPE worn by the concrete pump operator should generally include:

- a safety helmet to EN 397,
- footwear to EN ISO 20345,
- overalls,
- suitable eye protection to EN 166 (Mechanical strength -S - increased robustness),
- ear defenders to EN 352,
- fall protection equipment,
- high visibility clothing to EN ISO 20471,
- impervious gloves/gauntlets to EN 374-2, and
- waterproof clothing as necessary to EN 343.

#### 14.3 Charging for PPE

Concrete pump operators should not be charged a cost for PPE.

#### 14.4 PPE Replacement

PPE should be replaced by the employer as necessary.

#### 14.5 Additional PPE

Other PPE should be supplied when a risk assessment deems this necessary.

### 15.0 CONCRETE PUMP RIGS INSPECTION AND TESTING

#### 15.1 Regulatory Requirements

A concrete placing boom is not an item of lifting equipment as defined in the 2007 General Application Regulations. However, Regulation 30 of the 2007 General Application Regulations requires that work equipment such as concrete pump rigs which is “exposed to conditions causing deterioration liable to result in a danger” (including concrete pump rigs) is inspected a regular intervals, see Annex 2.

#### 15.2 EC Declaration of Conformity

An EC Declaration of Conformity must be issued by the manufacturer for each new concrete pump supplied. This declares that the machine conforms with the Machinery Directive (Directive 2006/42/EC of the European Parliament and of the Council) and the DOC also lists the standards that are used to justify the claim of conformity with the Directive.

#### 15.3 Inspection

In accordance with the 2007 General Application Regulations, a concrete placing boom must undergo periodic inspections and, where appropriate, testing and if deterioration is detected it must be remedied in good time.

#### 15.4 Inspection Frequency

A concrete pump rig should undergo a major inspection by a competent person who has the necessary knowledge and experience to carry out that duty:

- every 500 operating hours, and
- at least once a year.

The manufacturer of the concrete pump or the competent person appointed to inspect it may specify a more frequent inspection period because of, for example, the machine’s age, condition or operating conditions.

#### 15.5 Report of Inspection

A report of inspection should be issued by the competent person following each major inspection and a copy should be made available for viewing on the machine. These may be stored in any way appropriate to the Owner of the machine such as in paper format or electronically. Annex 2 gives details of the information which the report should contain.

## 15.0 Concrete Pump Rigs Inspection and Testing (Cont'd)

### 15.6 Safe Working Load

The safe working load of the machine, that is the maximum weight of the full length of the delivery hose full of concrete to be suspended from the concrete placing boom, should be clearly marked on the machine and shown on the inspection reports. Any other conditions, for example the deployment of stabilisers, should be noted on the report of inspection.

### 15.7 Retention of Inspection Records

Following an inspection, the record should be retained for a period of at least five years to prove a regular inspection regime in accordance with Annex B of EN 12001:2003.

### 15.8 Weekly and Maintenance Inspections

Inspections should be completed by the concrete pump operator on a weekly basis at least, and by mechanical staff carrying out routine services. A written record of the inspections should be retained and be available at all times for examination. An example of a daily and weekly checks and inspections record is given in Annex 6.

### 15.9 Sale of Used Equipment

If a used concrete placing boom is sold, the current report of inspection and its EC declaration of conformity should be supplied to the buyer.

## 16.0 Maintenance

### 16.1 General

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

### 16.2 Maintenance Inspections

The concrete pump owner should carry out regular inspections of the concrete pump and vehicle to ensure that they are fit for use.

### 16.3 Defects Reporting and Recording

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

**NOTE:** Any defects affecting vehicle safety have to be reported immediately to the maintenance department.

### 16.4 Minor Defects

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.

### 16.5 Preventative Maintenance

A programme of servicing the vehicle, the concrete placing 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.

### 16.6 Testing of Vehicle Brakes

The braking system should be serviced and tested at least every six months.

### 16.7 Retention of Maintenance Records

Maintenance and service records should be retained for 5 year to prove a regime of regular maintenance. It is very helpful to retain inspection records for the whole life of the machine as this will enable the effectiveness of maintenance to be evaluated and failure trends established.

Setting up a machine history file for all machine related records will ensure that all information covering the purchase, use, maintenance and inspection of the machine are available in one place and can be easily accessed.

## ANNEX 1: CONCRETE PUMP HIRE CHECKLIST

### Annex 1: Concrete Pump Hire Checklis

1	Date of Hire	
2	Name of Hirer	
3	Name of Project Supervisor Construction Stage	
4	Site Address	
5	Size of Boom Required	
6	Site Visit Required	
7	Site Contact Name	
8	Site Telephone Number	
9	Concrete Supplier and Mix Details	
10	Concrete Supplier Telephone Number	
11	Time Required on Site	
12	m <sup>3</sup> of Concrete to be Pumped	
13	Special Requirements:- <ul style="list-style-type: none"> <li>• Linesman</li> <li>• Extra Pipes/Compressor/Water Supply</li> <li>• Spark Arrester</li> <li>• Steel Fibre Concrete</li> </ul>	
14	Provisional or Confirmed Booking	
15	Overhead Power Lines	
16	Order Number	
17	Washout Area	
18	Adequate Insurance Cover	
19	Ground Condition Assessment	
20	Name of Competent Person compiling the Risk Assessment and Method Statement	
21	Adequacy of Lighting	

## Annex 2: Inspection of Concrete Pump Rigs in accordance with Regulation 30 of the 2007 Safety Health and Welfare at Work (General Application) Regulations

### ANNEX 2: INSPECTION OF CONCRETE PUMP RIGS IN ACCORDANCE WITH REGULATION 30 OF THE 2007 SAFETY HEALTH AND WELFARE AT WORK (GENERAL APPLICATION) REGULATIONS

An inspection should include as a minimum (where applicable):

- a visual inspection of all sections of the boom, its supporting structure, securing devices and stabilisers;
- non-destructive testing of the structure and welds when it is deemed necessary by the competent person;
- the opening up of concealed or encased parts to the extent required by the competent person;
- measurement of backlash / play in the slewing system;
- measurement of wear in the slewing rack thrust pad;
- lift in the slewing ring;
- the integrity of the slewing ring bolts;
- measurement of wear in pins and bushes at the boom joints;
- a check on the security of boom pins;
- the condition of boom pipe brackets;
- the presence of security pins in pipe couplings on the boom pipeline;
- the condition of the boom tip safety chain and its anchorage;
- the correct operation of lock valves on the boom's hydraulic rams;
- the stabiliser locking system for both travelling and working;
- the mounting fixtures for the pump sub-frame and the boom pedestal to the chassis;
- the operation of levers and switches on the remote control box(es);
- the condition of the remote control box lead;
- the operation of manual control levers;
- the operation of all emergency stop controls;
- the clear marking of all controls;
- the satisfactory operation of safety switches, for example slewing limits;
- the operation of interlock systems, for example on the receiving hopper;
- the integrity of the receiving hopper grille;
- the guarding of the concrete pump cylinders' flushing box;
- the guarding of the machine's prop-shaft;
- the guarding of pump and valve change over rams
- the condition of the machine steps and walkway;
- the condition of the washing-out adaptor and the sponge cleaning ball catching basket;
- working lights;
- appropriate warning signs; and
- the manufacturer's identification plates.

### ANNEX 3: INFORMATION TO BE CONTAINED IN AN INSPECTION REPORT

The below information should be outlined in an inspection report following the inspection of a concrete pump rig in accordance with Regulation 30 of the 2007 Safety, Health & Welfare at Work (General Application) Regulations. This will generally be every 12 months or every 500 operational hours. These figures might be reduced depending on advice from the manufacturer or the competent person carrying out the inspection.

- 1) The name and address of the employer for whom the inspection was carried out.
- 2) The address of the premises at which the inspection was carried out.
- 3) Particulars sufficient to identify the equipment including, where known, its date of manufacture.
- 4) The date of the last inspection.
- 5) The safe working load of the concrete pump rig.
- 6) In relation to every inspection of a concrete pump rig:
  - a) identification of any part found to have a defect which is or could become a danger to persons, and a description of the defect;
  - b) particulars of any repair, renewal or alteration required to remedy a defect found to be a danger to persons; and
  - c) in the case of a defect which is not yet but could become a danger to persons:
    - i) the time by which it could become such a danger; and
    - ii) particulars of any repair, renewal or alteration required to remedy it;
  - d) the latest date by which the next inspection must be carried out;
- 7) Where the inspection included testing, particulars of any test.
- 8) The date of the inspection.
- 9) The name, address and qualifications of the person completing the report; that he is self-employed or, if employed, the name and address of his employer.
- 10) The name and address of a person signing or authenticating the report on behalf of its author.
- 11) The date of the report.

**ANNEX 4: RECOMMENDED HAND SIGNALS**



START PUMPING



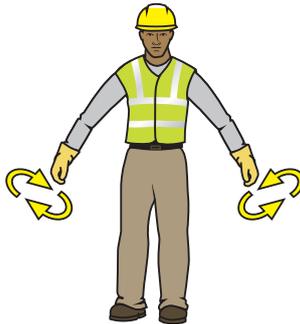
STOP PUMPING



EMERGENCY STOP



RAISE THE BOOM



LOWER THE BOOM SLOWLY



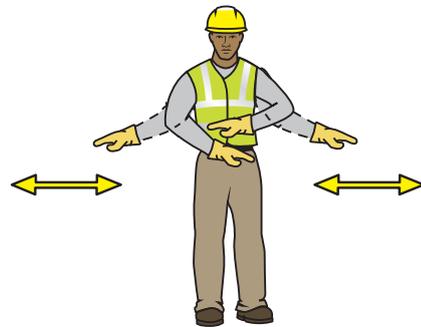
LOWER THE BOOM



SLEW LEFT



SLEW RIGHT



END OF POUR

### ANNEX 5: COMPETENCE AND COMPETENCE SCHEMES

The duty to ensure that plant operators are competent rests with their employer. The process of ensuring competence requires cooperation between employers, training providers and operators, all of whom have a significant part to play in the process.

Training may indicate a general level of ability to operate plant but does not take into account the difficulty of the task or complexity of environment or experience of the operator. These all have a bearing on the successful management of the task.

The route to ensuring that an operator is competent to perform a task begins with assessment of the individual. An appropriate level of maturity and responsibility must be present within the candidate before they can even be considered as suitable for the task. This assessment is followed by a period of initial training where familiarisation with the operation of the machine and the working environment are built up under supervision; the greater the experience, the less reliance on supervision. At the end of this basic training, a test of the practical and theoretical knowledge should be taken and passed.

At this point, it is reasonable to assume that the operator is responsible for the safe use of their work equipment with minimal supervision. As operators gain experience they will be faced with more challenging situations. Therefore a commitment to on-going development is necessary. This should be recorded within a log book or equivalent as evidence of being able to undertake more complex tasks.



### ANNEX 7: PUMPING CONCRETE TO PILING RIGS

A specialist application of concrete pumping is to form bored piles. In this application a hollow stemmed auger is screwed into to ground and as the auger is withdrawn, concrete is pumped through the auger to fill the void created by the withdrawing auger. A rigid steel reinforcement cage is then pushed into the fluid concrete to allow a connection to the overlying structure.

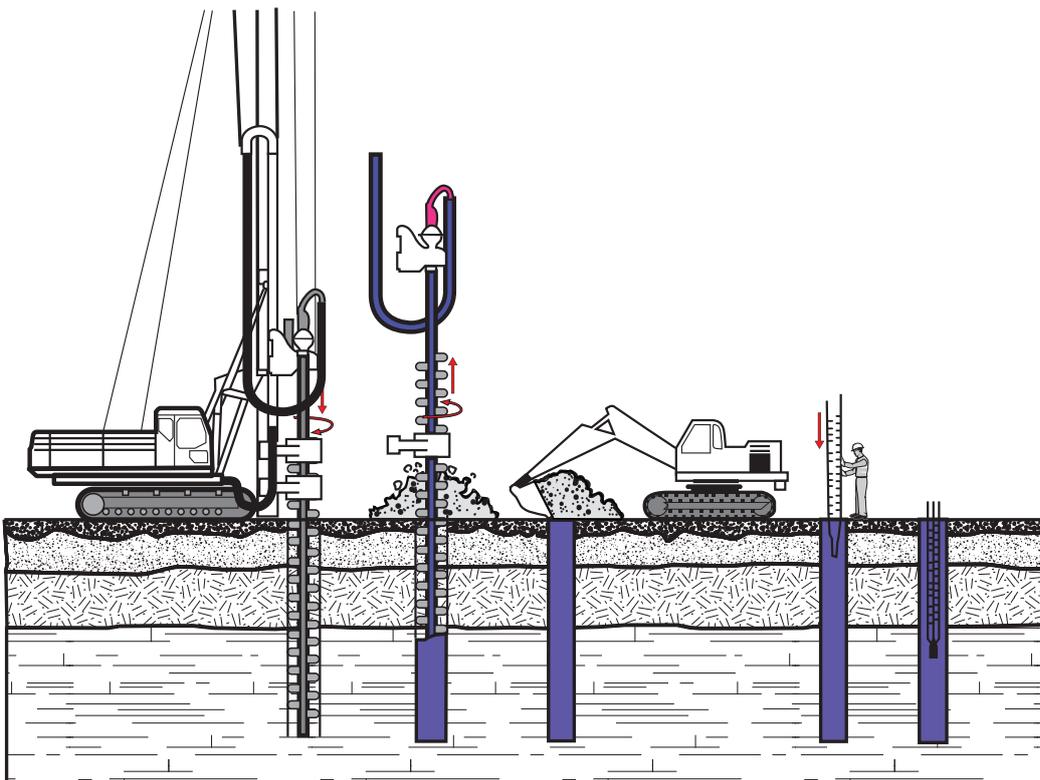


Figure A1: Sequence of Operations

#### A7.1 Specific Features of concrete Pumping for Piling

- a. A Static pump is normally used.
- b. As the piling rig is tracking to different pile positions, rubber ground hoses are normally used.
- c. To allow the auger to move up and down the rig mast, the rig will include a steel pipe up the side of the mast to a 180° bend termed the “elbow”. From this, there is a loop of rubber hose connecting to the “swan neck” on the rotary table atop of the auger assembly. This hose is termed the “loop hose” or “drop hose”. See Figure A1 above.
- d. To ensure continuity of concrete supply between delivery loads, a site concrete agitator (similar to a ready-mixed concrete drum) is normally used. The concrete is placed into the agitator either by pumping or by direct discharge using an access ramp.

- e. As the rate of auger extraction must match the rate of concrete delivery, direct and continuous communication is necessary between the pump operator and the rig operator.

### **A7.2 Site Planning**

- a. During setting up the site, the pump should be located convenient to the site entrance yet generally centrally to the piling operations.
- b. The hoses to the rig should be routed so they will not be driven or tracked over. Where road crossings are necessary, hose bridges should be used or the hose buried in a shallow trench.
- c. The pump operators' work area should normally be segregated from other site activities by fencing or other robust demarcation. Within this area, a safe and non-slip working environment is to be provided and maintained.
- d. The pump may be in position for many weeks and will be washed out daily. If there is a risk of wash water finding a route to a sensitive receptor, including groundwater, the area should be lined.

### **A7.3 Care and Maintenance of the Pumping Line**

- a. All hose connections should be inspected daily before pumping commences.
- b. Hoses should be visually inspected weekly and a record made. Damaged hoses should be replaced and put into quarantine or discarded.
- c. Other elements of the pumping line should be inspected weekly and a record made. This should include all steel pipes, clamps and supports.
- d. All connections on the drop/loop hoses on the piling rig should incorporate a safety sling to independently connect the hose to the rig should the coupling fail.
- e. Care should be taken in coiling and lifting hoses that damage is not caused by kinking or crushing the hose.

### **A7.4 Cleaning of Concrete Hoses**

Organisations should have in place clear operating procedures to deal with the following operations:-

- a. Priming the pumping line at the beginning of operations.
- b. Cleaning out the pumping line from the pump to the auger tip at the end of operations.
- c. Depressurising and cleaning out section of hose in the case of a blockage. These procedures should include PPE requirements, restraint of the hose, and control of expelled concrete.

### ANNEX 8: BIBLIOGRAPHY

#### Legislation

Safety, Health & Welfare at Work Act 2005

Safety Health & Welfare at Work (General Application) Regulations 2007 (S.I. No. 732 of 2007) as amended by S.I. No. 299 of 2007, S.I. No. 176 of 2010, S.I. No. 445 of 2012) and S.I. No. 36 of 2016

European Communities (Machinery) Regulations, 2008 [S.I.No.407 of 2008]

Safety, Health and Welfare at Work (Construction) Regulations 2013 (S.I. 291 of 2013)

Chemicals Act 2008 (No. 13 of 2008) and Chemicals (Amendment) Act 2010 (No 32 of 2010) and associated regulations

#### Standards

BS 8476:2007, *Code of Practice for the safe use of concrete pumps*

I.S. EN 471:2003+A1:2007, *High-visibility warning clothing for professional use – Test methods and requirements*

I.S. EN 12001:2012, *Conveying, spraying and placing machines for concrete and mortar – Safety requirements*

I.S. EN ISO 12100:2010, *Safety of machinery - General principles for design - Risk assessment and risk reduction*

#### Other Publications

HSA Guidelines on Risk Assessments and Safety Statements

HSE Leaflet INDG163 – *Five Steps to Risk Assessment*

HSE Leaflet INDG 73 – *Working Alone in Safety*

ESB Code of Practice for Avoiding Danger from Overhead Lines (approved by the HSA)

RSA Guide to EU Rules ON DRIVERS' HOURS

RSA Guide TO KEEPING YOUR COMMERCIAL VEHICLE ROADWORTHY

### Useful Websites

Health and Safety Authority	<a href="http://www.hsa.ie">www.hsa.ie</a>
Construction Plant-Hire Association	<a href="http://www.cpa.uk.net">www.cpa.uk.net</a>
CITB	<a href="http://www.citb.co.uk">www.citb.co.uk</a>
Construction Industry Federation	<a href="http://www.cif.ie">www.cif.ie</a>
Irish Concrete Federation	<a href="http://www.irishconcrete.ie">www.irishconcrete.ie</a>
Strategic Forum for Construction	<a href="http://www.strategicforum.org.uk">www.strategicforum.org.uk</a>
Road Safety Authority.	<a href="http://www.rsa.ie">www.rsa.ie</a>

## Annex 9 – Members of the Construction Safety Partnership Advisory Committee (CSPAC)

### ANNEX 9 – MEMBERS OF THE CONSTRUCTION SAFETY PARTNERSHIP ADVISORY COMMITTEE (CSPAC)

#### **Chairman (Joint)**

John Graby

Pat Kenny, Communication Workers Union

#### **Member Organisations**

Association of Consulting Engineers of Ireland  
Building and Allied Trades' Union  
Communication Workers Union  
Construction Industry Federation  
Department of Business, Enterprise and Innovation  
Dublin City Council  
Engineers Ireland  
ESB Networks  
Health and Safety Authority  
Health Service Executive  
Ibec  
Institution of Occupational Safety and Health  
Irish Congress of Trade Unions  
Local Government Management Agency  
Microsoft  
National Irish Safety Organisation  
Royal Institute of Architects of Ireland  
Society of Chartered Surveyors of Ireland  
SIPTU  
SOLAS

### Further Information and Guidance:

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Use BeSMART, our free online risk assessment tool at [www.besmart.ie](http://www.besmart.ie)

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