

مركز أبوظبي للصحة المهنية والسلامة
ABU DHABI OCCUPATIONAL SAFETY AND HEALTH CENTER

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Abu Dhabi Occupational Safety and Health System Framework

(OSHAD-SF)

Code of Practice

CoP 38.0 – Concrete Placing Equipment

Version 3.0

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ABU DHABI PUBLIC
HEALTH CENTRE

مركز أبوظبي
للصحة العامة



Important Note:

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1. Introduction

- (a) This Code of Practice (CoP) applies to all employers within the Emirate of Abu Dhabi. This CoP is designed to incorporate requirements set by Abu Dhabi Occupational Safety and Health Centre (OSHAD) and Sector Regulatory Authorities in the Emirate of Abu Dhabi.
- (b) This CoP establishes the requirements and standards so that the risks associated with the use of concrete placing equipment are assessed, that control measures are implemented in accordance with the hierarchy of controls and that control measures are taken to prevent injury, illness and disease to persons who might be exposed to risks arising from those activities.
- (c) This CoP applies to the safe operation of all types of concrete pumps and associated placing equipment used in pumping or spraying concrete.
- (d) The pumping of concrete is an efficient method of moving and placing concrete. This basic process is used in the manufacture of pre-cast and tilt-up panels, reinforced concrete construction, slab construction, concrete paving and concrete spraying.

2. Training and Competency

- (a) Employers shall ensure that OSH training complies with the requirements of:
- (i) *OSHAD-SF – Element 5 – Training, Awareness and Competency;*
 - (ii) *OSHAD-SF – Mechanism 7.0 – OSH Professional Entity Registration; and*
 - (iii) *OSHAD-SF – Mechanism 8.0 – OSH Practitioner Registration.*
- (b) In accordance with *OSHAD-SF – Element 1 – Roles, Responsibilities and Self-Regulation Section 3.2.5* employers shall ensure employees required to implement the requirements of this CoP are trained in the use of concrete placing equipment and understand the risks associated with using the plant and the control measures put in place by the employer.
- (c) Employers shall ensure all employees involved in the concrete placing equipment and activities trained to recognise and respond to hazards associated with this type of work.
- (d) Employers shall ensure that all personnel are trained to recognize the hazards of working with wet concrete and the propensity of dermatitis.
- (e) Employers shall ensure an overall training programme is planned for both employees and supervisors, and shall include, but not limited to the:
- (i) work method to be used in the setting-up and safe operation of concrete placing booms and pumps;
 - (ii) method for inspection and maintenance and a knowledge of the manufacturer's operation and service manuals;
 - (iii) correct use, care and storage of personal protective equipment; and
 - (iv) correct use, care and storage of tools and equipment to be used, including electrical safety practices.
- (f) Employers shall maintain a record of the required training that contains the following information:
- (i) name and ID number;
 - (ii) Emirates ID number of the employee;
 - (iii) subject(s) of training;
 - (iv) dates(s) of training; and
 - (v) person(s) providing the training.

3. Requirements

3.1 Roles and Responsibilities

3.1.1 Employers

- (a) Employers shall undertake their roles and responsibilities in accordance with the general requirements of *OSHAD-SF – Element 1 – Roles, Responsibilities and Self-Regulation* Section 3.2.5.
- (b) Employers shall undertake their specific roles and responsibilities in accordance with the following:
 - (i) concrete pumping work is appropriately planned, organised and appropriately supervised;
 - (ii) those involved in concrete pumping and the equipment are trained and competent;
 - (iii) the location / site where concrete pumping work is undertaken is as safe as reasonably practicable;
 - (iv) concrete placing equipment is appropriately maintained and inspected; and
 - (v) where an employer is to use concrete placing equipment from another entity the employer shall ensure that the equipment is inspected by competent person and declared safe and appropriate for use.

3.1.2 Principal Contractors

- (a) In the case of the Building and Construction Sector, Principal Contractors shall undertake their roles and responsibilities in accordance with the general requirements of *OSHAD-SF – CoP 53.0 – OSH Management during Construction Work*.
- (b) Principal Contractors shall undertake their specific roles and responsibilities in accordance with the following:
 - (i) ensure that contractors have been informed of all available descriptions of the site, including design drawings, site surveys, plans of services and information on the nature and location of hazardous materials, the nature of building materials and the building or structure's relationship to surrounding properties;
 - (ii) all relevant authorities and utility service providers are notified and all necessary approvals are obtained before work commences; and
 - (iii) the workplace is secured to prevent unauthorised access.

3.1.3 Employees

- (a) Employees shall undertake their roles and responsibilities in accordance with the general requirements of *OSHAD-SF – Element 01 – Roles, Responsibilities and Self-Regulation* Section 3.2.7.
- (b) Employees shall undertake their specific roles and responsibilities in accordance with the following:
 - (i) following information provided by the employer regarding concrete placing equipment use;

- (ii) observing the concrete placing equipment safe work practices and other control measures implemented by the employer, including the observation of warning signs; and
- (iii) following procedures for inspection and maintenance of concrete pumping equipment.

3.2 Planning and Assessment

3.2.1 General Requirements

(a) Employers shall ensure the following:

- (i) an assessment of the various risks is undertaken and systems of work are established, which are safe to all parties involved or affected including the public;
- (ii) effective control measures are in place, which are implemented in order to manage activities safely and without risk to health;
- (iii) that for the Building and Construction Sector the management of concrete placing equipment requirements are included in the Pre-Tender Safety and Health Plan in accordance with *OSHAD-SF – CoP 53.0 – OSH Management During Construction Work*; and
- (iv) that associated safe systems of work, and site rules are included in the Safety and Health Construction Management Plan (OSH-CMP) in the case of the Building and Construction Sector in accordance with *OSHAD-SF– CoP 53.0 – OSH Management During Construction Work*.

3.2.2 Risk Assessment

- (a) Employers shall ensure that prior to the undertaking of concrete pumping operations a risk assessment is conducted to ensure the selection of appropriate control measures. Refer to *OSHAD-SF – Element 2 – Risk Management*.
- (b) Employers shall ensure the risk assessment considers the following general hazards and manual handling risks associated with the use of concrete placing which may include:
 - (i) the movement of concrete placing equipment and concrete pipe lines around the site;
 - (ii) access to difficult to reach areas where the concrete pipeline may be required to reach;
 - (iii) access to the pour area through the site and the use of access equipment and scaffolding;
 - (iv) space restrictions when running the concrete pipe line and making connections in difficult to reach areas;
 - (v) positioning of the concrete pump and placement boom with regards to the structural integrity of the means of fixing;
 - (vi) recoil from the flexible concrete placing pipe line used by employees when concrete is being pumped;
 - (vii) the effects of high winds on concrete placing booms especially when located in open and exposed areas;

- (viii) the high pressures involved in concrete placing equipment and the consequences of pipe or placing boom deterioration through internal friction and abrasion;
- (ix) manual handling risks associated with moving pipes, clamps and other associated equipment; and
- (x) health hazards of working with wet concrete.

3.3 Planning and Preparation

- (a) When planning for concrete pumping and concrete placing works on site the employer shall consider such factors as:
 - (i) the most appropriate method of pumping concrete to the pour area;
 - (ii) location of the concrete pump in the most favourable position to pump concrete;
 - (iii) level area of ground with a firm base that is capable of supporting the pump unit;
 - (iv) clear access to the pump unit for concrete trucks;
 - (v) the capacity and type of pump to be used to complete the job satisfactorily;
 - (vi) safe and unobstructed access for the general public if the pump unit is set up in the street;
 - (vii) provision of pedestrian ramps if the pump line has to cross the footpath;
 - (viii) approval of the formwork structure and suitability in accordance with *OSHAD-SF – CoP 40.0 – Falsework (Formwork)*;
 - (ix) time schedule assessment to complete the work prior to commencing a major pour which allows for:
 - 1. weather;
 - 2. accessibility;
 - 3. volume of concrete;
 - 4. concrete supply factors;
 - 5. slab limitations; and
 - 6. restricted work times.
 - (x) provision of personal protective equipment, in line with the requirements of *OSHAD-SF – CoP 2.0 – Personal Protective Equipment*, and other safety equipment;
 - (xi) provision of safe access for employees to the pour area including elimination of trip and slip hazards wherever reasonably practicable; and
 - (xii) existence of overhead power cables if using a truck mounted concrete placing boom.
- (b) Employers shall ensure truck mounted concrete placing booms are equipped with all necessary safety equipment, including:
 - (i) stocked first aid kit (shall include eye wash and barrier creams);
 - (ii) charged and current fire extinguisher; and
 - (iii) appropriate number of reflective traffic cones (minimum 450mm high).
- (c) Employers shall provide additional safety equipment if the pump is set-up on or near a roadway and may include:

- (i) pedestrian warning and diversion signs;
- (ii) vehicle traffic warning signs; and
- (iii) traffic management equipment.

3.4 Documented Safe Systems of Work

- (a) Employers shall ensure documented safe systems of work are developed and implemented and include reference to any instruction manuals supplied with the pump unit and boom, giving comprehensive instructions for operation.

3.5 Setting Up

3.5.1 Setting-Up on Site

- (a) When setting-up on site employers shall ensure:
 - (i) the area around the concrete pump shall be level, solid and free from obstructions;
 - (ii) the pump is not being positioned over or adjacent to:
 - 1. previously disturbed ground that has been back-filled;
 - 2. excavations, trenches or holes in the ground;
 - 3. cellars, basements or pits; or
 - 4. inadequately compacted or soft ground.
 - (iii) if outriggers are used, baseplates shall be provided to ensure outriggers do not subside;
 - (iv) regular checks are conducted on the outriggers to ensure stability; and
 - (v) the outriggers pads are clear of excavations, soft or filled ground, or other obstacles liable to interfere with the safe operation of the machine. If the ground is not firm or is near an excavation the employer shall ensure that the bearing pressure of the ground is not exceeded by the pressure of the foot of any outrigger.
- (b) Employers shall ensure precautions are taken when a concrete pump is used in the vicinity of an excavation due to the weight of the concrete pump and the load which can affect the stability of the excavation wall and cause a slip to occur which may lead to the concrete pump overturning.
- (c) Employers shall ensure unauthorised persons are kept away from the immediate area of the concrete pump with the use of appropriate barriers or guardrails.
- (d) Employers shall ensure concrete delivery trucks shall have clear and safe access to approach and leave the receiving hopper of the pump and if more than one truck is required to approach the receiving hopper at any one time, a spotter or traffic controller shall be on hand to safely direct the movement of the trucks.

3.5.2 Setting-Up Near Power Lines or Electrical Equipment

- (a) Employers shall ensure the when setting up near overhead power lines the electricity authority is consulted to determine minimum safe distance requirements, as per the requirements of *OSHAD-SF – CoP 15.0 – Electrical Safety* and *OSHAD-SF and CoP 39 – Overhead and Underground Services*.
- (b) Employers shall ensure swinging of the overhead power lines and of the placing boom in the wind shall also be taken into account when setting distances from power lines.
- (c) All overhead power lines or electrical conductors shall be considered LIVE unless they are positively identified to be isolated from all sources of the power supply. A certificate issued by the electricity authority shall be issued indicating that all power lines and electrical conductors have been de-energised.

3.5.3 Setting-Up in a Public Place

- (a) When setting-up a concrete pump in a street, roadway or other public place employers shall ensure:
 - (i) protective screens shall be erected or fitted around the concrete pump area to prevent concrete being splashed on the public;
 - (ii) a close fitting mesh shall be fitted to the concrete pump hopper to prevent concrete splash;
 - (iii) a sign stating "concrete pump being used" or "concrete pump in operation" is posted in a language that is easily understood by those passing by; and
 - (iv) provision of an access ramp for the public when a concrete line crosses over the footpath. The ramp shall:
 1. be stable and of solid construction and capable of performing the purpose it was designed for;
 2. not create a trip hazard at the leading edge of the ramp;
 3. have a height to length ratio of no more than 1:12 from the highest point to the end of the ramp;
 4. be easily negotiable by wheelchair;
 5. be provided with a non-slip surface even when wet;
 6. extend across the width of the footpath;
 7. be fitted with handrails and toe boards at an appropriate height for both adults and small children and follow the contour of the ramp;
 8. have appropriate lighting to ensure the area is appropriately illuminated at all times; and
 9. have pump pipes that are removable for inspection and cleaning.

3.6 General Requirements

3.6.1 Operational Safety Zone

- (a) Employers shall ensure access to areas around the concrete pump and delivery pipeline are restricted; the use of one or more of the following control measures shall be considered:
- (i) covered walkways;
 - (ii) mesh fence panels;
 - (iii) fixed barricades;
 - (iv) cones and tape or flags; or
 - (v) appropriate signage.
- (b) Employers shall ensure where the concrete pumping or pipeline set-up is for a project with a longer time duration the isolation methods shall be of a more permanent nature.

3.6.2 Traffic Control

- (a) Employers shall ensure the following:
- (i) that pedestrians on or off the site are not at risk from trucks delivering concrete to the pump by nominating a person whose duties shall be to control the traffic; and
 - (ii) this person shall wear the appropriate personal protective equipment including a high visibility jacket or tabard.

3.6.3 Fumes

- (a) Employers shall ensure the following:
- (i) that an appropriate level of ventilation is maintained to prevent the build-up of exhaust gases; and
 - (ii) where a concrete pump is located in an enclosed or confined area where there is a likelihood of build-up of gases from internal combustion engines, precautions are to be taken to direct the gases to the open air.

3.6.4 Occupational Noise

- (a) Employers shall ensure the following:
- (i) the noise levels from machinery or equipment during pumping operations shall not be a risk to hearing or health in accordance with the requirements contained in *OSHAD-SF – CoP 3.0 – Occupational Noise and OSHAD-SF - CoP 3.1 – Vibration*;
 - (ii) appropriate hearing protection equipment is provided to all employees in the vicinity of the concrete pump and other associated equipment if the noise is in excess of the noise exposure limits; and
 - (iii) hearing protection zones are set up and clearly indicated with safety signs to ensure that all employees working in areas where the noise levels are in excess of the limits set in *OSHAD-SF – CoP 3.0 – Occupational Noise and CoP 3.1 – Vibration* wear hearing protection.

3.6.5 Occupational Health

- (a) Employers shall ensure that all staff that work with wet concrete are fully aware of the hazards and the propensity of dermatitis.
- (b) Employers shall develop an occupational health program to undertake regular occupational screening and monitoring for employees working with wet concrete.

3.6.6 Residue Collection

- (a) Where a permanent or semi-permanent concrete pumping set-up has been established on site or where a concrete pump is set-up in a roadway or public place employers shall ensure a method to collect concrete residue is put in place. All necessary precautions shall be taken to prevent wash-down residue from the clean-up of concrete pumping operations finding its way into surface or storm-water drains, this also includes concrete delivery trucks.

3.7 Equipment

3.7.1 Water and Air Lines

- (a) Employers shall ensure where compressed air and water lines are supplied on site for use with the concrete pump they shall be positioned to avoid damage to the lines and shall as far as reasonably practicable be kept well clear of any public place.

3.7.2 Pump Gauges

- (a) Employers shall ensure the following:
 - (i) the gauges fitted to the concrete pump are accurate and of a size and style that are easy to read; and
 - (ii) the instruments are to be checked on a regular basis and the results recorded in the concrete pump's log book.

3.7.3 Concrete Pipelines

- (a) Employers shall ensure the following:
 - (i) when laying a pipeline avoid the use of unnecessary bends;
 - (ii) horizontal pipelines are to be appropriately supported;
 - (iii) each section of pipe in a vertical pipeline is supported to avoid extra load on the pipe clamp;
 - (iv) the right angle (90 degree) bend where the concrete pipeline changes from a horizontal to a vertical plane shall be equipped with a leg sitting firmly on the ground; and
 - (v) vertical pipelines are mechanically secured to the building.

3.7.4 Pipe Clamps

- (a) Employers shall ensure when using quick release pipe clamps that each clamp is locked using the locking pin to prevent accidental release.

3.7.5 Anchor Brackets

- (a) Employers shall ensure that enough anchor brackets and tie-downs are used to appropriately secure the system.
- (b) On a vertical (riser) pipeline, brackets shall be mechanically fixed to the wall or to the edge of each floor slab at no more than 3 metres intervals.

3.7.6 Delivery Hose

- (a) Employers shall ensure the following:
 - (i) the rubber delivery hose is checked for damage prior to being fitted;
 - (ii) If used on a concrete placing boom or concrete skip where it may pass vertically over either employees or the public it shall be fitted with an appropriate stop cap at the outlet end;
 - (iii) control measures are taken to prevent damage to the hose during use; and
 - (iv) the delivery hose on a boom pump is secured in position by a safety chain, sling or other retaining device in accordance with the manufacturer's specifications.

3.7.7 Pipe Movement

- (a) Employers shall ensure that appropriate mechanical fixings are provided along the pipeline to control the surging action created as concrete is pumped through the pipeline, special attention shall be given at bends and elbows.

3.7.8 Receiving Hopper

- (a) Employers shall ensure the following:
 - (i) the receiving hopper is positioned securely so that it can receive concrete flow readily from the discharge chute of a concrete delivery truck;
 - (ii) a hinged grill is provided to prevent access to dangerous moving parts such as feed or agitator mechanisms and the value gear. The grill shall be constructed of parallel bars, spaced so that it is not reasonably practicable for a person's hand to become trapped; and
 - (iii) the spacing of the grill parallel bars shall not exceed 70mm and the distance from the grill to moving parts shall be at least 150mm.

3.7.9 Line Cleaning

- (a) Employers shall ensure the following:
 - (i) line cleaning is carried out by experienced and trained pumping personnel;
 - (ii) there is always a connection to atmosphere (air relief valve) as well as the air entry point to the pipeline. This connection is to allow the system to be depressurised before removing any pipeline; and
 - (iii) where a cleaning ball is used and blown through the concrete pipeline an appropriate ball catcher shall be used at the end of the line and the area shall be cleared of all unnecessary personnel.

3.7.10 Pump Cleaning

- (a) Employers shall ensure the following:
- (i) before a person places any part of their body into a pump opening that the engine is shut down and the controls actuated to exhaust any hydraulic accumulators which can allow the elements to move or rotate with the engine stopped;
 - (ii) when cleaning that another person is in the immediate vicinity to provide assistance if required; and
 - (iii) ensure isolation in accordance with *OSHAD-SF – CoP 24.0 – Lock-out /Tag-out (Isolation)*.

3.8 Deck Area Concreting

- (a) Employers shall ensure the following safety precautions are adopted for deck area concreting:
- (i) perimeter guardrails or safety screens shall be securely in place. Where guardrails are used the top rail shall be fixed a minimum of 950mm above the finished concrete slab level;
 - (ii) enable appropriate access for those carrying equipment to the pour area. These walkways can consist of scaffold planks placed at least two planks wide which can be moved back as the pour progresses;
 - (iii) a confined area such as slip-form or jump-form can present a fume or fire hazard during a pour and electric powered vibrating machines shall be used rather than petrol driven machines. Fire extinguishers shall be on hand in the immediate work area where petrol machines are in use; and
 - (iv) workplaces and access to workplaces where a concrete pour is being carried out shall be appropriately lit, in accordance with *OSHAD-SF – CoP 8.0 – General Workplace Amenities*.

3.9 Preparation for Road Travel

- (a) Employers shall ensure the manufacturer's requirements are followed and include:
- (i) lock hydraulic operated booms and outriggers in the stowed or travelling position;
 - (ii) stow all loose components, such as pipes, couplings and tools; and
 - (iii) disengage all drives to hydraulic pumps for operating the concrete pump, boom and outriggers and put the controls in the OFF position.

3.10 Inspection and Maintenance

3.10.1 General Requirements

- (a) Employers shall ensure a maintenance and inspection program is developed which shall include provisions for:
 - (i) pre-operational checks and tests;
 - (ii) routine inspection and maintenance at specified time intervals;
 - (iii) recording in the logbook and maintenance records all:
 - 1. inspections and maintenance;
 - 2. defects found and repairs undertaken; and
 - 3. structural alterations.
- (b) Employers shall ensure appropriate control measures are implemented for the inspection and maintenance of concrete pumps and booms to ensure they remain in a safe condition.
- (c) Manufacturer's requirements shall be followed with regards to daily checks. Any repairs or replacements shall be in accordance with the manufacturer's recommendations.
- (d) Only trained and competent personnel shall carry out inspections, repairs or replacement.
- (e) All pipeline, including reducers, bends, hose and couplings shall be inspected monthly and a record of the inspection shall be maintained.
- (f) Periodic ultrasonic testing for metal parts and areas reasonably foreseeable to be subjected to wear shall be carried out based on concrete flow volumes through each section of pipeline, reducer or bend.
- (g) Records of the pipeline inspection shall be kept in the log book or on site in the case of fixed pipeline installation.
- (h) Concrete placing booms and pumps and all other associated equipment, except pipelines, shall be thoroughly examined once a year by a competent person and the results entered in the log book. This is in addition to the daily visual checks and inspections by the operator prior to the equipment being used.
- (i) In the case of concrete placing booms there shall be a thorough check of all areas of potential wear or fatigue at least every 6 years. This inspection shall include but not be limited to:
 - (i) the complete stripping and inspection of the slew ring or king post assembly;
 - (ii) the replacement of the slew ring bolts;
 - (iii) magnetic particle, dye penetration or radiographic checking of all critical areas for cracking;
 - (iv) ultrasonic thickness testing of any wear areas or corroded sections; and
 - (v) detailed inspection of all arm joints including bearings, bushes, pins, links.

3.10.2 Welding

- (a) Employers shall ensure that only person(s) authorized by the boom manufacturer shall perform welding work on the placing boom, the outrigger system or other stressed structural components that are related to the placing boom's stability or structural integrity.

3.10.3 Reporting Defects

- (a) The concrete pump operator shall report defects without delay. If a defect is considered to be a hazard to safety, pumping operations shall be stopped until the defect is repaired. The repairs shall be recorded in the log book.

3.10.4 Log Books and Inspection Check Sheets

- (a) Employers shall ensure the following:
 - (i) a log book is maintained that sets out the complete details of all inspections, tests, repairs and modifications carried out on equipment;
 - (ii) evidence is available to prove that plant has been competently inspected and is in a safe working condition before the plant is allowed on site; and
 - (iii) no machine shall operate without having an up-to-date log book available for inspection at the workplace.

3.10.5 Pipe Identification

- (a) Employers shall ensure pipes, bends and reducers are identified with a permanently fixed metal tag with numbers not less than 10mm in height.

3.10.6 Pipe Ends and Hose Tails

- (a) Employers shall ensure all pipes ends and hose tails are regularly inspected by a competent person.

3.10.7 Couplings

- (a) Employers shall ensure all couplings are regularly inspected by a competent person for signs of wear and fatigue and couplings showing deformation or damage that affect the efficiency of the coupling action shall be replaced.

4. Record Keeping

- (a) Employers shall maintain records in accordance OSHAD-SF – *Element 9 – Compliance and Management Review*.
- (b) Log books and inspection check sheets.
- (c) Third party annual inspection certificate(s).

5. References

- *OSHAD-SF – Element 1 – ,Roles, Responsibilities and Self-Regulation*
- *OSHAD-SF– Element 2 – Risk Management*
- *OSHAD-SF– Element 9 – Compliance and Management Review*
- *OSHAD-SF – CoP 2.0 – Personal Protective Equipment*
- *OSHAD-SF – CoP 3.0 – Occupational Noise*
- *OSHAD-SF – CoP 3.1 – Vibration*
- *OSHAD-SF – CoP 8.0 – General Workplace Amenities*
- *OSHAD-SF – CoP 15.0 – Electrical Safety*
- *OSHAD-SF – CoP 24.0 – Lock-out / Tag-out (Isolation)*
- *OSHAD-SF – CoP 39.0 – Overhead and Underground Services*
- *OSHAD-SF – CoP 53.0 – OSH Management during “Construction Work”*

6. Document Amendment Record

Version	Revision Date	Description of Amendment	Page/s Affected
3.0	1 st July 2016	Change of Logo	All
		Change from AD EHS Center to OSHAD	throughout
		Change of document title: AD EHSMS RF to OSHAD-SF	Throughout
		Acknowledgements deleted	2/3
		Preface Deleted	4
		EHS changes to OSH	throughout

