WAC 296-155-682 Requirements for equipment and tools. (1) **Bulk cement storage.** Bulk storage bins, containers, and silos must be equipped with the following:

(a) Conical or tapered bottoms; and

(b) Mechanical or pneumatic means of starting the flow of material.

(2) You must not permit any employee to enter storage facilities unless the ejection system has been shut down and locked out in accordance with WAC 296-155-429.

(3) You must use harnesses, lanyards, lifelines or droplines, independently attached or attended, as prescribed in chapter 296-880 WAC, Unified fall protection.

(4) **Concrete mixers.** Concrete mixers with one cubic yard (.8 m3) or larger loading skips must be equipped with the following:

(a) A mechanical device to clear the skip of materials; and

(b) Guardrails installed on each side of the skip.

(5) **Power concrete trowels.** Powered and rotating type concrete troweling machines that are manually guided must be equipped with a control switch that will automatically shut off the power whenever the hands of the operator are removed from the equipment handles.

(6) **Concrete buggies.** Concrete buggy handles must not extend beyond the wheels on either side of the buggy.

Note: Installation of knuckle guards on buggy handles is recommended.

(7) **Runways.**

(a) Runways must be constructed to carry the maximum contemplated load with a safety factor of 4, have a smooth running surface, and be of sufficient width for two buggies to pass. Single runs to have a minimum width of 42 inches with turnouts. Runways to have standard railings. Where motor driven concrete buggies are used, a minimum 4-inches by 4-inches wheel guard must be securely fastened to outside edge of runways.

(b) All concrete buggy runways which are 12 inches or more above a work surface or floor, or ramps with more than 4 percent incline are considered "elevated" runways.

Exception: Small jobs utilizing only one concrete buggy, or larger jobs utilizing a "one-way traffic pattern" may be exempt from the requirements for "turnouts" or for "sufficient width for two buggies to pass."

Exemption: Runways less than 12 inches above the floor or ground which are utilized by hard-powered buggies only, may be exempt from the requirements for guardrails and wheelguards.

(8) **Concrete pumps and placing booms.**

(a) **Definitions.**

Concrete delivery hose. A flexible concrete delivery hose which has two end couplings.

Concrete pump. A construction machine that pumps concrete.

Controls. The devices used to operate a machine.

Delivery systems. The pipe, hoses and components, through which the concrete is pumped.

Grooved end. A pipe clamp pipe connection where a groove is machined or rolled directly into the outside of the pipe wall (for example: Victualic).

Material pressure. The pressure exerted on the concrete inside the delivery system.

Placing boom and placing unit. A manual or power driven, slewable working device which:

• Consists of one or more extendable or folding parts for supporting the concrete delivery system, and directs the discharge into the desired location; and

• May be mounted on trucks, trailers, or special vehicles.

Qualified person. Someone who:

• Possesses a recognized degree or certificate of professional standing; or

• Has extensive knowledge, training, and experience; or

• Successfully demonstrated the ability to resolve problems relating to the work.

Restraining devices. A sling, cable, or equivalent device used to minimize excess movement of a delivery system in case of separation.

Whip hoses. A suspended hose that has only one coupling and is used to direct the delivery of concrete.

(b) **Equipment requirements.**

(i) Equipment identification tag.

You must ensure the following identification is furnished if originally identified by the manufacturer and on all pumps manufactured after January 1, 1998:

• The manufacturer's name;

• The year of manufacture;

• The model and serial number;

• The maximum material pressure;

• The maximum allowable pressure in the hydraulic system; and

• The maximum weight per foot of delivery system including concrete.

(ii) Manufacturer's manual.

You must have the manufacturer's operation/safety manual or equivalent available for each concrete pump or placing boom.

(iii) Unsafe condition of equipment.

If during an equipment inspection a condition is revealed that might endanger workers, you must not return the equipment to service until the condition is corrected.

(iv) Controls.

Controls must have their function clearly marked.

(v) Hydraulic systems.

(A) Concrete pumps and placing booms hydraulic systems must have pressure relief valves to prevent cylinder and boom damage.

(B) Hydraulic systems must have hydraulic holding valves if hose or coupling failure could result in uncontrolled vertical movement.

(vi) Certification.

In the event of failure of a structural member, overloading, or contact with energized electric power lines and before return to service, the equipment must be certified safe by:

• The manufacturer; or

• An agent of the manufacturer; or

• A professional engineer.

(vii) Marking weight. A permanent, legible notice stating the total weight of the unit must be marked on:

• Trailer or skid mounted concrete pumps;

• Placing booms; and

• All major detachable components over 500 pounds.

(viii) Lifting a pump.

A concrete pump must be lifted using the lift points specified by the manufacturer or a professional engineer.

(ix) Emergency shutoff.

A concrete pump must have a clearly labeled emergency stop switch that stops the pumping action.

(x) Inlet and outlet guarding.

(A) The waterbox must have a fixed guard to prevent unintentional access to the moving parts.

(B) The agitator must be guarded with a point of operation guard in accordance with chapter 296-806 WAC, Machine safety, and the guard must be:

- Hinged or bolted in place;
- At least 3 inches distance from the agitator;
- Be capable of supporting a load of 250 pounds.

(C) A person must not stand on the guard when the pump or agitator is running.

(xi) Outriggers.

(A) You must use outriggers in accordance with the manufacturer's specifications.

(B) Concrete pump trucks manufactured after January 1, 1998, must have outriggers or jacks permanently marked to indicate the maximum loading they transmit to the ground.

(xii) Load on a placing boom.

(A) The manufacturer's or a licensed, registered, structural engineer's specifications for the placing boom must not be exceeded by:

- The weight of the load;
- The length and diameter of suspended hose;
- The diameter and weight of mounted pipe.

(B) A concrete placing boom must not be used to drag hoses or lift other loads.

(C) All engineering calculations regarding modifications must be:

- Documented;
- Recorded; and
- Available upon request.

(xiii) Pipe diameter thickness. The pipe wall thickness must be measured in accordance with the manufacturer's instruction, and:

- Be sufficient to maintain a burst pressure greater than the maximum pressure the pump can produce;
- The pipe sections must be replaced when measurements indicate wall thickness has been reduced to the limits specified by the manufacturer.

(xiv) Pipe clamps.

(A) You must not pump concrete through a delivery system with grooved ends, such as those for Victualic-type couplers.

(B) Pipe clamps must have a pressure rating at least equal to the pump pressure rating.

(C) Pipe clamps contact surfaces must be free of concrete and other foreign matter.

(D) If quick connect clamps are used, you must pin or secure them to keep them from opening when used in a vertical application.

(xv) Delivery pipe.

(A) Delivery pipe between the concrete pump and the placing system must be supported and anchored to prevent movement and excessive loading on clamps.

(B) Double ended hoses must not be used as whip hoses.

(C) Attachments must not be placed on whip hoses (i.e., "S" hooks, valves, etc.).

Table 1, Nonmandatory
Recommended maximum yards per hour through hose

Hose Diameter	Hose Length (12' and less) Max. yards per hour	Hose Length (12' and longer) Max. yards per hour
2"	30	30

Hose Diameter	Hose Length (12' and less) Max. yards per hour	Hose Length (12' and longer) Max. yards per hour
3"	90	50
4"	160	110
5"	See manufacturer specs	See manufacturer specs

• The above figures are based on a minimum of a 4" slump and a 5 sack mix.

• Variables in mix design can have an effect on these ratings.

• Aggregate should not exceed 1/3 the diameter of the delivery system.

(xvi) Restraining. A restraining device must:

• Be used on attachments suspended from the boom tips; and

• Have a load rating not less than 1/5 of its ultimate breaking strength.

(xvii) Equipment inspection.

(A) An inspection must be conducted annually for the first 5 years and semiannually thereafter and must include the following:

• Nondestructive testing of all sections of the boom by a method capable of ensuring the structural integrity of the boom;

• Be conducted by a qualified person or by a private agency.

(B) The inspection report must be documented and a copy maintained by the employer and in each unit inspected. It must contain the following:

• The identification, including the serial numbers and manufacturer's name, of the components and parts inspected and tested;

• A description of the test methods and results;

• The names and qualifications of the people performing the inspection;

• A listing of necessary repairs; and

• The signature of the manufacturer, an agent of the manufacturer, or a qualified person.

Note: See WAC 296-155-628 (8)(d) for the inspection worksheet criteria.

(xviii) Equipment repair.

(A) Replacement parts must meet or exceed the original manufacturer's specifications or be certified by a registered professional structural engineer.

(B) A properly certified welder must perform any welding on the boom, outrigger, or structural component.

(xix) Compressed air cleaning of the piping system. To clean the piping system:

(A) The pipe system must be securely anchored before it is cleaned out.

(B) The flexible discharge hose must be removed.

(C) Workers not essential to the cleaning process must leave the vicinity.

(D) The compressed air system must have a shutoff valve.

(E) Blow out caps must have a bleeder valve to relieve air pressure.

(F) A trap basket or containment device (i.e., concrete truck, concrete bucket) must be available and secured to receive the clean out device.

(G) Delivery pipes must be depressurized before clamps and fittings are released.

(c) Qualification and training requirements.

(i) Operator trainee—Qualification requirements. To be qualified to become a concrete pump operator, the trainee must meet the following requirements unless it can be shown that failure to meet the requirements will not affect the operation of the concrete pump boom.

(A) Vision requirements:

• At least 20/30 Snellen in one eye and 20/50 in the other. Corrective lenses may be used to fulfill this requirement;

• Ability to distinguish colors, regardless of position, if color differentiation is required;

• Normal depth perception and field of vision.

(B) Hearing requirements: Hearing adequate to meet operational demands. Corrective devices may be used to fulfill this requirement.

(ii) Operator trainee—Training requirements. Operator trainee training requirements include, but are not limited to, the following:

(A) Demonstrated their ability to read and comprehend the pump manufacturer's operation and safety manual.

(B) Be of legal age to perform the duties required.

(C) Received documented classroom training and testing (as applicable) on these recommended subjects:

• Driving, operating, cleaning and maintaining concrete pumps, placing booms, and related equipment;

• Jib/boom extensions;

• Boom length/angle;

• Manufacturer's variances;

• Radii;

• Range diagram, stability, tipping axis; and

• Structural/tipping determinations.

(D) Maintain and have available upon request a copy of all training materials and a record of training.

(E) Satisfactorily completed a written examination for the concrete pump boom for which they are becoming qualified. It will cover:

• Safety;

• Operational characteristics and limitations; and

• Controls.

(iii) Operator—Qualification requirements. Operators will be considered qualified when they have:

(A) Completed the operator trainee requirements listed in (c)(i) and (ii) of this subsection.

(B) Completed a program of training conducted by a qualified person, including practical experience under the direct supervision of a qualified person.

(C) Passed a practical operating examination of their ability to operate a specific model and type of equipment. Possess the knowledge and the ability to implement emergency procedures.

(D) Possess the knowledge regarding the restart procedure after emergency stop has been activated.

(E) Possess the proper class of driver's license to drive the concrete pump truck.

(F) Demonstrate the ability to comprehend and interpret all labels, safety decals, operator's manuals, and other information required to safely operate the concrete pump.

(G) Be familiar with the applicable safety requirements.

(H) Understand the responsibility for equipment maintenance.

(d) Concrete pump inspection worksheet criteria. Concrete pump trucks will be inspected using the following criteria: The manufacturer's required inspection criteria will be followed in all instances.

Note: DOT requirements for inspections - Ref. 49.C.F.R.396.11, Driver Vehicle Inspections and 396.13, Driver Pre-Trip Inspections; and WAC 296-155-610.

(i) Hydraulic systems.

(A) Oil level;

(B) Hoses;

(C) Fittings;

(D) Holding valves;

(E) Pressure settings;

(F) Hydraulic cylinders;

(G) Ensure that the emergency stop system is functioning properly;

(H) All controls clearly marked.

(ii) Electrical.

(A) All systems functioning properly.

(B) All remote control functions are operating properly. Ensure that the emergency stop system is functioning properly.

(C) All controls clearly marked.

(iii) Structural.

(A) Visual inspection for cracks, corrosion, and deformations of the concrete pump with placing boom structure, and all load carrying components such as outriggers, cross frames, torsion box beams, and delivery line support structures that may lead to nondestructive testing.

(B) Visual examination of all links, pivots, pins, and bolts.

(C) Vertical and horizontal movement at the turret, turntable, rotation gear lash, bearing tolerances, not to exceed manufacturer's specifications.

(iv) Piping systems.

(A) Wall thickness must not exceed original manufacturer's specifications.

(B) Mounting hardware for attaching delivery system.

(C) Correct clamps and safety pins.

(v) Safety decals.

All safety decals must be in place as required by the manufacturer.

(9) **Concrete buckets.**

(a) Concrete buckets equipped with hydraulic or pneumatic gates must have positive safety latches or similar safety devices installed to prevent premature or accidental dumping.

(b) Concrete buckets must be designed to prevent concrete from hanging up on top and the sides.

(c) Riding of concrete buckets for any purpose is prohibited, and you must keep vibrator crews out from under concrete buckets suspended from cranes or cableways.

(d) When discharging on a slope, you must block the wheels of ready-mix trucks and set the brakes to prevent movement.

(10) **Tremies.** You must secure sections of tremies and similar concrete conveyances with wire rope (or equivalent materials in addition to the regular couplings or connections).

(11) **Bull floats.** Bull float handles, used where they might contact energized electrical conductors, must be constructed of nonconductive material or insulated with a nonconductive sheath whose electrical and mechanical characteristics provide the equivalent protection of a handle constructed of nonconductive material.

(12) Masonry saws must be constructed, guarded, and operated in accordance with WAC 296-155-367 (1) through (4).

(13) **Lockout/tagout procedures.** You must not permit any employee to perform maintenance or repair activity on equipment (such as compressors, mixers, screens, or pumps used for concrete and masonry construction activities) where the inadvertent operation of the equipment could occur and cause injury, unless all potentially hazardous energy sources have been locked out and tagged in accordance with chapter 296-155 WAC, Part I.

[Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, 49.17.060 and chapter 49.17 RCW. WSR 20-08-117, § 296-155-682, filed 3/31/20, effective 10/1/20. Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, 49.17.060. WSR 16-09-085, § 296-155-682, filed 4/19/16, effective 5/20/16. Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, 49.17.060 and 29 C.F.R. 1926, Subpart M, Fall Protection. WSR 13-04-073, § 296-155-682, filed 2/4/13, effective 4/1/13. Statutory Authority: RCW 49.17.010, 49.17.040, 49.17.050, and 49.17.060. WSR 04-14-028, § 296-155-682, filed 6/29/04, effective 1/1/05. Statutory Authority: RCW 49.17.010, [49.17].040, [49.17].050 and chapter 49.17 RCW. WSR 00-21-102, § 296-155-682, filed 10/18/00, effective 2/1/01. Statutory Authority: Chapter 49.17 RCW. WSR 95-10-016, § 296-155-682, filed 4/25/95, effective 10/1/95; WSR 94-15-096 (Order 94-07), § 296-155-682, filed 7/20/94, effective 9/20/94; WSR 91-03-044 (Order 90-18), § 296-155-682, filed 1/10/91, effective 2/12/91; WSR 90-17-051 (Order 90-10), § 296-155-682, filed 8/13/90, effective 9/24/90; WSR 89-11-035 (Order 89-03), § 296-155-682, filed 5/15/89, effective 6/30/89.]