

QUICK GUIDE

COBOD Piston pump – Extreme weather conditions



GUIDE OBJECTIVE

The objective of this guide is to provide clear and comprehensive guidance on the COBOD pump maintenance checks, preventive measures, operational best practices, and troubleshooting procedures when operating under extreme weather conditions, including both high and low temperatures.

SAFETY DISCLAIMER

Servicing, inspecting, or troubleshooting the piston pump involves moving and high-force components that can cause serious injury. Never place hands, tools, or any part of the body near moving parts while the pump is operating. Always ensure the pump is completely shut down, de-energized, and secured against accidental start-up before performing any inspection, adjustment, or maintenance. All work must be carried out by trained and authorized personnel only. Maintain clear communication between operators, spotters, and maintenance staff at all times, and confirm that all personnel are aware of the pump's status before beginning work. Appropriate personal protective equipment (PPE), including but not limited to gloves, eye protection, and safety footwear, must be always worn when working on or around the pump.



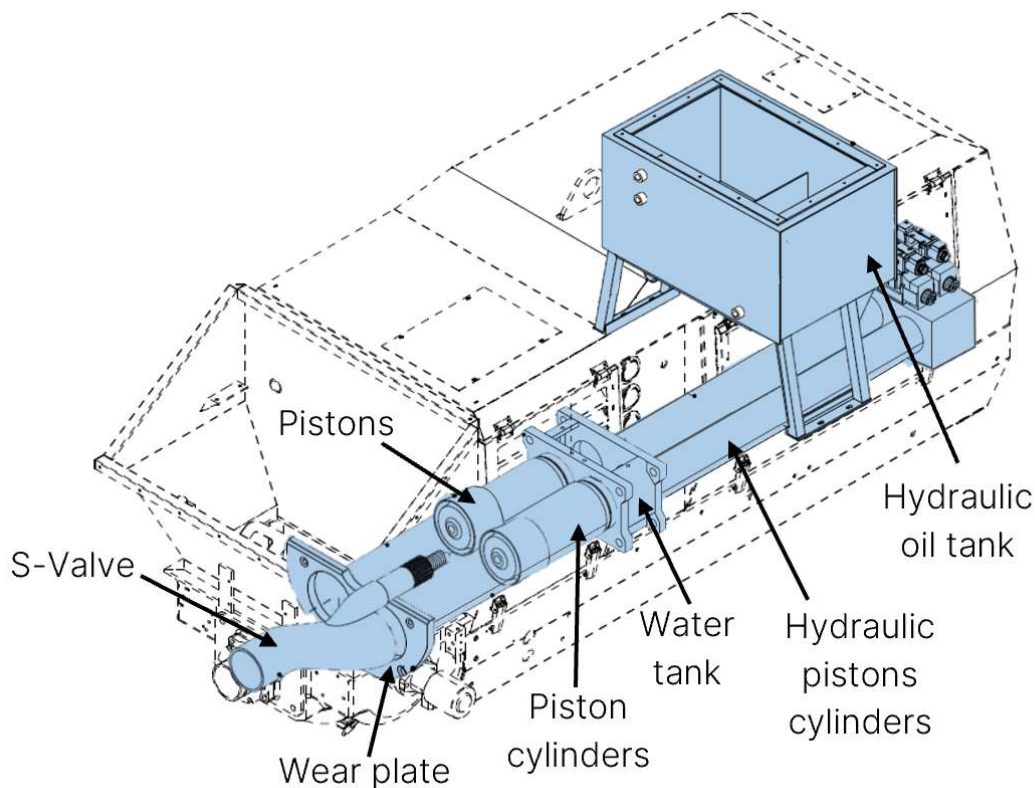
DEFINITION

Ideal temperature conditions

Ideal temperature conditions are defined as operational environments where the ambient temperature stays between 5°C (41°F) and 32°C (90°F) during operational hours, with zero to moderate precipitation.

SYSTEM OVERVIEW

The COBOD pump can operate under certain circumstances in extreme weather conditions; if specific daily maintenance and weather specific operational checks are performed to ensure optimal operation and reliability. The components in the pump that are the most sensitive to temperature variations are: The water tank, the hydraulic oil system, and all parts of the equipment in direct contact with concrete such as the lower hopper, S-valve, and pistons. Concrete properties can vary significantly depending on ambient temperature, which may directly impact pump performance and overall system efficiency.



EXTREME COLD CONDITIONS

Definition

Extreme cold conditions are defined as operational environments where the ambient temperature falls below 5°C (41°F) during operational hours.

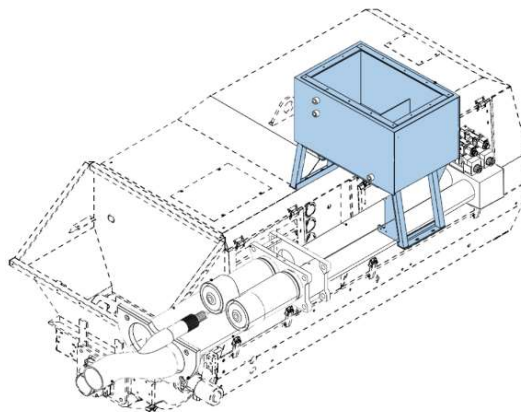
General precautions for extreme cold conditions

- Operations shall only be performed when ambient temperatures are above 0°C (33°F). If daily temperatures drop and stay below freezing point, consider a heated tent that fits the entire equipment inside, or re-schedule printing for warmer conditions.
- Monitor hourly temperature forecasts daily to plan operations and avoid exposure to freezing conditions.
- Prioritize morning or midday prints to allow time for setting before temperatures drop.
- Maintain a cold-weather log recording ambient and concrete temperatures.
- Printing operations in freezing conditions are not recommended due to the risk of water freezing within the concrete matrix, which can cause internal damage through freeze-thaw cycles.
- Printing should only be performed when using a properly designed winter concrete mix specifically engineered for low-temperature conditions. As a formal recommendation, operations should be postponed if freezing conditions cannot be avoided.
- Verify ground stability and surface drainage to prevent water accumulation or ice ponding around the pumping area. Ensure the site is graded or treated to prevent the formation of ice patches that could compromise the level and safety of the machinery and create hazardous slip conditions.

Preventive maintenance for extreme cold conditions

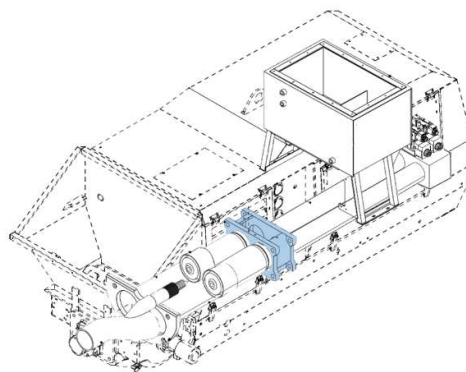
Hydraulic oil:

The hydraulic oil originally supplied with the pump is rated for operation in temperatures of approximately 0 °C (32°F) to 65 °C (149°F). During colder months, ambient temperatures can often drop well below freezing, especially at night. Even if temperatures rise above freezing by morning, the oil may take time to reach a safe operating viscosity. To ensure reliable operation and protect the pump, it is recommended to use a hydraulic oil formulated for low-temperature performance if the pump is operated in winter or during very cold conditions.



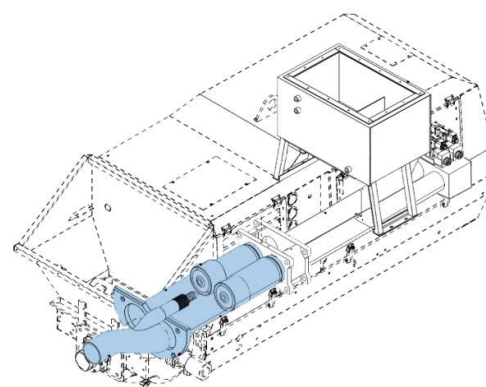
Water:

Frozen water inside the tank can cause expansion, potentially damaging components in contact with it, such as inductive sensors and pistons. To prevent this, the water tank should be emptied after each day of operation. Additionally, filling the tank with water that is significantly warmer than the ambient temperature (more than ~30 degrees difference) can create thermal shock in sensitive components. The recommended practice is to use water at or slightly above ambient temperature to refill the tank.



Concrete:

Using water for mixing concrete at temperatures near freezing slows the hydration process, which reduces workability and makes the mix more resistant to pumping. Cold water also increases the apparent viscosity of the mix, making it thicker; if the water is near freezing, ice formation can further reduce flow. To maintain pumpable concrete and prevent blockages, it is recommended to preheat the mixing water to 10–20 °C before adding it to the mix.



Operational recommendations for extreme cold conditions

Before Pumping:

- Pre-warm equipment (Let pump motor run for 5 minutes); ensure hoses and lines are not frozen.
- Make sure concrete hose is free of water, use insulated sleeves if necessary.
- Check hydraulic oil condition (It should be sufficient in level and clear looking, not foggy).
- Fill up pump water tank with slightly above ambient temperature water.



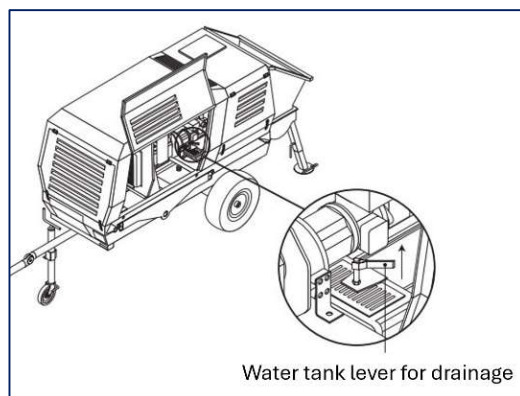
During Pumping:

- Maintain constant flow—avoid interruptions that could cause freezing in hoses.
- Monitor the pressure in the hose by constantly looking at the pressure gauge.
- Watch for signs of reduced flow due to freezing buildup.
- Keep a concrete temperature log using a thermometer and adjust the mix if necessary (Specifically the accelerator and stiffener play an important role in very cold conditions).



After Pumping:

- The cleaning of the hose is a priority, and the cleaning balls should be pumped twice (Ideally with slightly above ambient water).
- Store hoses dry and elevated to prevent moisture accumulation and freezing.
- Empty pump water tank.
- Clean pump hoppers, pistons, and valves thoroughly.
- Make sure S-valve, and hose connection pipes and adaptors are free of water.



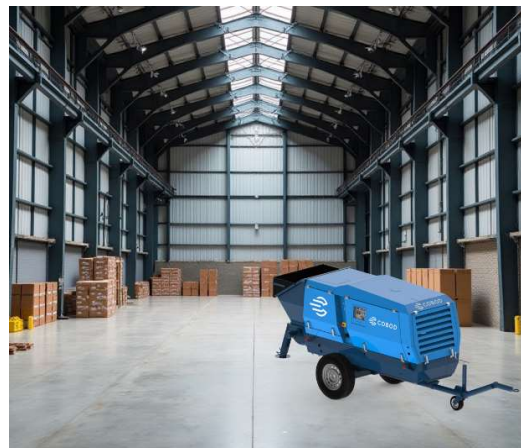
Equipment idle period procedures for extreme cold conditions

If the equipment will remain idle for more than two weeks during the colder months, please follow the recommendations below.

Shutdown Checklist



- Thoroughly clean all equipment of concrete, aggregate, and water.
- Drain water tank completely to prevent residual water from freezing.
- Inspect all gaskets and replace any that are cracked or worn.
- Apply grease to gates, hinges, and moving parts to prevent corrosion.
- Cover sensitive components with weatherproof covers or tarps.
- If available, place the pump inside a warehouse or insulated facility.



Monthly Storage Check

- Visually inspect gaskets, seals, and covers to ensure moisture has not entered the system.
- Cover the hopper to avoid animals nesting inside and monitor regularly.
- Check hydraulic oil level and color.

Top 3 most common issues for extreme cold conditions

- Hydraulic oil not warm enough / incorrect specification for cold temperatures:
When extreme cold temperatures occur (especially overnight), the hydraulic oil may become too cold to operate properly. This can cause the pump motor to produce a high-pitched noise during start-up. To prevent this issue, use a hydraulic oil specifically designed for low-temperature operation or pre-warm the hydraulic oil tank before starting the motor.
- Water freezing inside the water tank or piston assembly:
If the water tank is not properly drained after operations, residual water may freeze overnight in cold conditions. The expansion of freezing water can create pressure within confined spaces, potentially affecting nearby components. This may interfere with piston movement or cause faults in the inductive sensors, leading to operational errors.
- Condensation forming inside the electrical cabinet:
If the pump is left outdoors for extended periods of time (e.g., several weeks), cold weather and temperature fluctuations may cause condensation to form inside the electrical cabinet. This can introduce moisture to sensitive electrical components that must remain dry for proper operation, such as the power supply unit. To prevent this



issue, the pump should be properly stored during idle periods, ideally inside a warehouse or other covered environment.

EXTREME HEAT CONDITIONS

Definition

Extreme heat conditions are defined as operational environments where the ambient temperature exceeds 32°C (90°F) during operational hours.

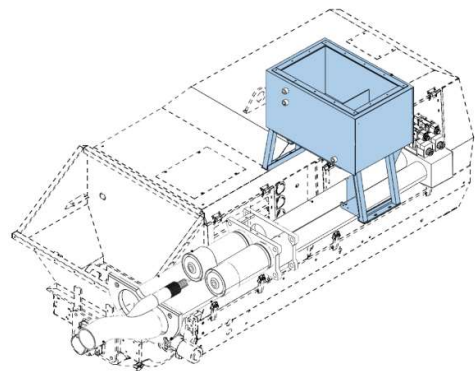
General precautions for extreme heat conditions

- Operations shall only be performed when ambient temperatures are below 43°C (110°F). If daily temperatures rise and stay above this number, consider printing at nighttime, or re-scheduling printing for cooler conditions.
- Monitor hourly temperature forecasts daily to plan operations and avoid exposure to heat waves or extreme sun exposure.
- Prioritize early morning or evening prints to avoid the hottest hour windows of the day.
- Maintain a hot-weather log recording ambient and concrete temperatures.
- Schedule a mid-of-day cleaning run to get rid of stiff material build-up in the hopper.
- Keep pump radiator clean, free of dust or debris.
- Constantly monitor the level of water inside the water tank and refill when it is low, this will ensure pistons keep an optimal temperature.

Preventive maintenance for extreme heat conditions

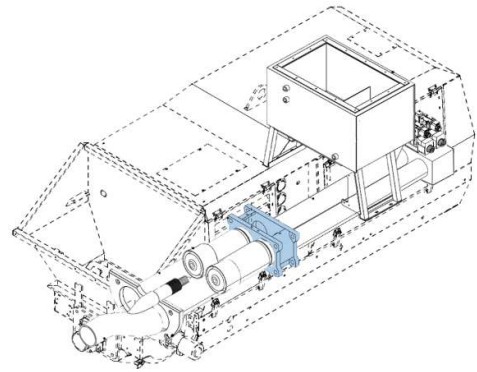
Hydraulic oil:

The hydraulic oil supplied with the pump is rated for operation in temperatures of approximately 0 °C (32 °F) to 65 °C (149 °F). In addition to ambient heat, the equipment experiences temperature increases from factors such as motor and piston operation, the concrete hydration process, and direct sunlight on metal components. As a result, the actual equipment temperature can easily be 30 °C (86 °F) or more above ambient. To ensure reliable operation and protect the pump, it is recommended to use hydraulic oil designed for high-temperature performance when operating the pump in very warm conditions.



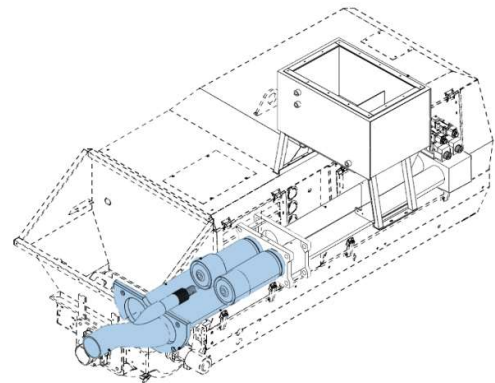
Water:

In extreme heat, the water in the tank can evaporate quickly. It is therefore important to ensure the tank always contains water. A good practice is to add water to the tank grid every two hours of operation until the tank is full. The water's primary purpose is to keep the pistons cool, so maintaining an adequate level at all times is essential. There is no need to cool the water, as water that is significantly cooler than ambient temperature can cause thermal shock to some components.



Concrete:

Concrete is highly sensitive to heat, as extreme temperatures accelerate the hydration process, reducing the open time and making the mix less workable. This can cause the concrete to stiffen more quickly inside the hopper and hose. It is therefore essential to consider temperature when designing and adjusting the mix, particularly regarding the water-to-cement ratio and the proportions of plasticizer and accelerator. Additionally, it is recommended to perform a cleaning run of the pump hopper and S-valve every four hours of continuous operation to prevent significant material buildup inside the pump.



Operational recommendations for extreme heat conditions

Before Pumping:

- Ensure hoses and S-valve are completely clean and free of solidified material.
- Make sure to grease thoroughly every greasing point in the pump.
- Check hydraulic oil condition and temperature (Warning light on control panel must be off, oil should be sufficient in level and clear looking).
- Completely fill up pump water tank.



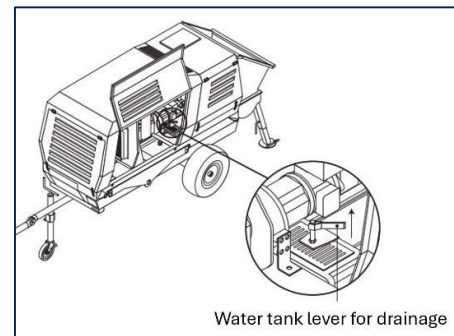
During Pumping:

- Maintain constant flow—avoid interruptions that could cause freezing in hoses.
- Monitor the pressure in the hose by constantly looking at the pressure gauge.
- Watch for signs of reduced flow due to freezing buildup.
- Keep a concrete temperature log using a thermometer and adjust the mix if necessary.
- Every 3-4 hours of constant printing make a 5 min stop to empty the pump lower hopper and quickly spray with pressure water the insides of the hopper to get rid of stiff material build-up.



After Pumping:

- The cleaning of the hose is a priority, and the cleaning balls should be pumped twice.
- Place special emphasis on cleaning the inside of the piston cylinders.
- Empty pump water tank.
- Clean pump hoppers, pistons, and valves thoroughly.



Equipment idle period procedure for extreme heat conditions

Shutdown Checklist

- Thoroughly clean all equipment of concrete, aggregate, and water.
- Drain water tank completely and inspect interior.
- Inspect all gaskets and replace any that are cracked or worn.
- Apply grease to gates, hinges, and moving parts to prevent corrosion.
- Cover sensitive components with weatherproof covers or tarps.
- If available, place the pump inside a warehouse or insulated facility.



Monthly Storage Check

- Visually inspect gaskets, seals, and covers to ensure moisture has not entered the system.
- Cover the hopper to avoid animals nesting inside and monitor regularly.
- Check hydraulic oil level and color.
- Keep power cable stored in an organized way, away from direct sunlight or extreme heat since this can alter the inside coil shape and functionality.

Top 3 most common issues for extreme heat conditions

- Material drying and setting inside the pump hopper and S-valve:
High temperatures accelerate the concrete hydration process, causing the material to stiffen and set significantly faster than under normal conditions, making it even more relevant to follow a strict maintenance and cleaning procedure. If the pump's greasing points are not properly lubricated before starting operations, slurry or concrete may enter the clearances around the S-valve components and fittings. Once inside these areas, the material can harden and restrict the movement of the S-valve, potentially causing it to become stuck. Additionally, the lower and upper hopper should be cleaned regularly, especially during continuous operation. Cleaning every 3–4 hours is recommended to prevent material buildup and premature hardening.



- Concrete hose clogs due to rapid material setting:

During extreme heat conditions, concrete can set rapidly and may harden inside the hose if flow is insufficient or interrupted. Hardened material can cause clogs and impede operation. Preventive measures include using white hoses to minimize heat absorption, adjusting the concrete mix to extend workability, for example by reducing accelerator or increasing plasticizer, and purging the hose whenever material remains stationary for longer than 10 minutes.

- Insufficient water in the tank for piston cooling:

During extreme heat conditions, water in the tank can evaporate more quickly, and equipment temperatures may rise. This can reduce the cooling available to the pistons, increasing the risk of overheating and potential impact on pump operation.

To prevent this, it is recommended to top up the water tank every 3–4 hours during continuous operation and regularly monitor the water level to ensure it does not run empty.

HEAVY RAINFALL CONDITIONS

Definition

Heavy rainfall conditions are defined as operational environments where continuous or intermittent rain (8-10 mm/h or higher) is present during operational hours and where water accumulation on equipment, materials, or surrounding surfaces may occur.

General precautions for heavy rainfall conditions

- Operations should be paused during intense or sustained rainfall that can allow water to enter the hopper or affect the concrete mix.
- Avoid pumping when rain can directly enter the pump hopper, as uncontrolled water will alter the water-to-cement ratio and negatively affect concrete performance.
- Monitor weather forecasts regularly to plan operations and avoid working during storms or periods of heavy precipitation.
- Ensure the equipment is positioned on stable, well-drained ground to prevent water pooling around the pump or electrical components.



Disclaimer: The information provided in this document is subject to change at any time without prior notice.

- Inspect the pump hopper regularly to ensure that no rainwater accumulation is occurring inside the mixing or pumping areas.
- Ensure all electrical cabinets and connectors are closed and properly sealed before operating in wet conditions.
- Rain usually brings wind. To prevent tarps and covers from blowing away and leaving your equipment unprotected, please ensure all covering materials are properly weighted down. Don't just "drape" the tarp; place weights on the corners and edges to keep them stationary.
- All tools and additional items needed for pumping operations should be stored indoors. In the absence of indoor storage, keep all essential
- pump operation tools, including cleaning balls, hose clamps, gaskets, greasing guns, hammers, crowbars, and wrenches, in a waterproof toolbox. This ensures easy access and organization on-site while protecting equipment from corrosion and damage caused by the elements or local animals.
- Verify ground stability and ensure robust surface drainage to prevent water accumulation and mud formation around the equipment. Saturated soil can lead to equipment subsidence or shifting; ensure the pump movement path route is stabilized with gravel or mats to prevent mobilization issues.

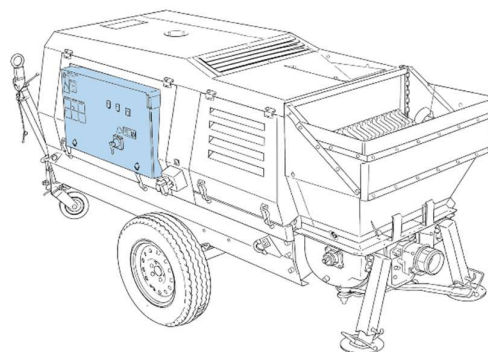


Preventive maintenance for heavy rainfall conditions

Electrical system:

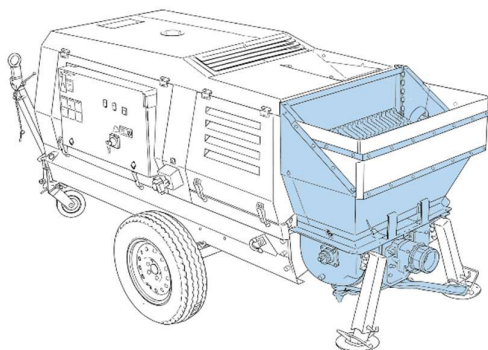
Water intrusion into electrical components can cause malfunctions, short circuits, or permanent damage. For this reason, extra care must be taken to protect electrical cabinet when operating in wet environments. It should remain fully closed and properly sealed during operation. Regularly inspect cabinet door seals, cable glands, and connectors to ensure they remain watertight. If water or condensation is detected inside the cabinet, the system should be powered down immediately and inspected before continuing operation.

It is also recommended to avoid placing cables directly on wet ground, as standing water may eventually enter damaged insulation or connectors.



Metal components and corrosion:

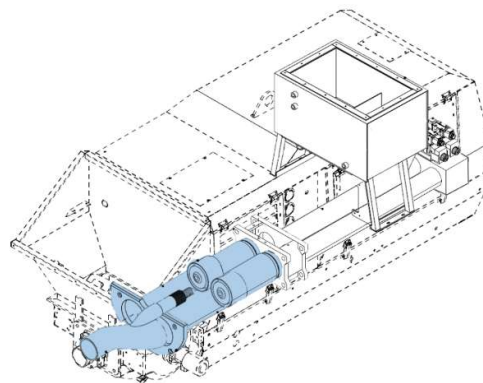
Continuous exposure to moisture can accelerate surface corrosion and premature rust formation, especially in the internal surfaces of the lower hopper bolts, hinges, and structural components. Regularly inspect metal surfaces for early signs of rust, such as small orange discolorations or surface oxidation. If detected early, affected areas should be cleaned and protected with light oil, grease, or anti-corrosion spray. Greasing points, hinges, gates, and exposed fasteners should be lubricated more frequently when equipment



is operating in rainy conditions to prevent moisture from accumulating in mechanical joints.

Concrete:

Rainwater can significantly affect concrete performance. If rainwater enters the hopper, it can dilute the concrete mixture and alter the designed water-to-cement ratio, which may result in reduced strength, inconsistent extrusion, segregation inside the hose and loss of buildability properties. To prevent this, ensure the hopper remains protected from direct rainfall whenever material is present. If rainwater is suspected to have entered the hopper, the material should be discarded and replaced with a properly controlled mix. If heavy rain continues, stop operations



and perform regular cleaning. Resume once rainfall has stopped.

Operational recommendations for heavy rainfall conditions

Before Pumping:

- Verify that no rainwater is present inside the hopper or pumping components. (As seen on the image on the right).
- Ensure all electrical cabinets, connectors, and cable glands are properly closed and sealed.
- Inspect hoses and S-valve to ensure they are clean and free of debris or water accumulation.
- Confirm that the equipment is placed on stable and well-drained ground.
- If light rain is expected, prepare protective covers for the hopper and sensitive components.



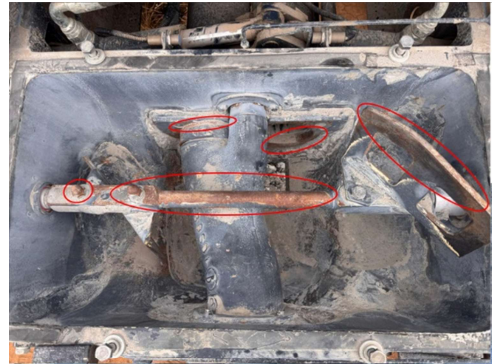
During Pumping:

- Continuously monitor the hopper to ensure rainwater is not entering the concrete mix.
- If rainfall intensity increases, pause pumping, clean the system and resume once conditions improve.
- Keep electrical the panel closed at all times during operation.
- Monitor the pressure gauge and material flow for irregularities that may result from mix segregation.
- Avoid leaving concrete sitting inside the hopper during rainfall for extended periods.



After Pumping:

- Clean all equipment thoroughly, ensuring no standing water remains inside the hopper, S-Valve, elbow, reducer, and concrete hoses.
- Inspect the electrical cabinet exterior and communication cable for moisture intrusion.
- Dry exposed metal surfaces when possible to reduce the likelihood of corrosion.
- Apply grease to exposed mechanical parts if equipment has been exposed to prolonged rain.



Equipment idle period procedure for heavy rainfall conditions

Shutdown Checklist

- Thoroughly clean all equipment of concrete, aggregate, and water. Empty the water tank.
- Leave the lower hopper gate open to allow any rainwater that may enter the hopper to drain freely.
- Cover the hopper and other sensitive components with waterproof covers or tarps.
- Ensure all electrical cabinets are fully sealed and protected from rain exposure.
- Inspect cables and connectors to ensure they are not resting in standing water.
- Apply grease to hinges, gates, and exposed metal parts to prevent corrosion.



Monthly Storage Check

- Apply corrosion protection to exposed steel components if necessary.
- Inspect metal surfaces for early signs of rust or corrosion.
- Verify that weather covers and tarps remain properly positioned and intact.
- Check electrical cabinets for condensation or moisture buildup.
- Confirm that drainage areas around the equipment remain clear and free of debris to prevent water pooling.



Top 3 most common issues for heavy rainfall conditions

- Water entering the pump hopper:
Heavy rainfall can allow water to enter the hopper, which alters the water-to-cement ratio of the concrete mixture. This can result in concrete segregation, inconsistent extrusion, clogging of the hose and poor layer buildability. To prevent this issue, pumping operations should be paused during heavy rain, and the hopper should be covered whenever possible.
- Electrical cabinet moisture intrusion:
Rainwater or condensation entering the electrical cabinet can cause electrical faults, sensor errors, or short circuits. Preventive measures include keeping cabinets fully sealed, regularly inspecting cable glands and connectors, and ensuring the cabinet door gaskets remain in good condition.
- Premature corrosion of exposed components:
Extended exposure to moisture can accelerate corrosion on exposed metal surfaces, bolts, hinges, and structural components. Early signs include surface oxidation and small rust spots. Preventive measures include frequent inspection, proper cleaning after rainfall, and applying protective grease or anti-corrosion treatments to exposed parts.

END OF DOCUMENT

Follow these recommendations to extend the life expectancy of your equipment. For any additional questions, please contact techsupport@cobod.com

