

# FocusOn **FACILITIES**

## Pump Maintenance

*By Howard McKew, P.E., C.P.E.*

This month we want to share with our readers the topic of maintenance of water pumps serving various buildings in the Diocese. These pumps require routine, “walk-around” observations at least monthly if not once a week, along with a regular planned preventive maintenance (PM) work order task schedule.

To start this discussion, there are a wide range of water pumps that can be found in a building, no matter the type of facility, e.g., church, school, recreation center, etc. and so we’ll jump right in by identifying the types and the systems they serve:

### Plumbing Systems

- Hot water in-line re-circulator
- Sump pump and receiver
- Well pump

### Heating Systems

- Hot water pumps
- In-line circulator
- End suction
- Horizontal split case
- Vertical split case

### Air-Conditioning Systems

- AC water pumps
  - In-line circulator
  - End suction
  - Horizontal split case
  - Vertical split case
  - Sump pump

Weekly “walk-around” tasks should take note of the following:



- Water leak(s) at the pump and more specifically the pipe connections, shut-off valve stems, and the motor drive shaft connection at the pump impeller casing.
- Accuracy of the water gages and possible leaks at the gage and/or pet cock (water shut-off to the gage).
- Condensation on the chilled water pump exterior and/or pipe, fittings, or valves due to insulation missing or damage resulting in this water leaking onto a floor or on to the ceiling directly below the pump. Water on the floor can be a slipping hazard and water dripping onto the ceiling can result in hazardous mold occurring, as well as damage to the ceiling itself.
- Excessive noise from the pump motor or the motor

shaft bearings requiring further investigation into the cause of the noise.

- Excessive vibration from the pump also requiring further investigation into the cause of this vibration.
- Pump is off when it should be operating. This could be due to a safety device, e.g., flow switch, shutting down the pump requiring further investigation.

Pumps not performing to their design intent are not a maintenance concern but more of a system performance issue requiring someone with knowledge of open and closed water systems. This would be classified as a trouble-shooting issue needing a heating and air-conditioning engineer, as well as a testing, adjusting, and balancing (TAB) technician to tune-up the pump system to improve performance and conserve electrical motor energy consumption.

Depending on whether the water system is classified as an “open” (open to atmospheric pressure) system or a “closed” (under city water pressure) system, each pump should have a water strainer at the pump inlet to filter and protect the pump from sediment that can occur in the water. Open water systems require regularly schedule strainer inspection because upstream of the pump, sediment, dirt, leave, etc. can be drawn into the return water system and captured at the filter. An example of this is if the building has a cooling tower, condenser water system where, at the bottom of the tower, is a water sump open to the atmosphere and whatever is in the air, e.g., leaves falling from a tree in the vicinity of the cooling tower can be drawn into the system.

Based on routine inspection and observation of the landscape around the tower sump, e. g., multiple trees versus no trees, the maintenance person may determine to check the water strainer once a week or bi-weekly. Whereas a closed system pump inlet strainer should be inspected annually.

It is suggested that the PM work order frequency be determined as follows:

- Systems that operate daily throughout the year, e.g., domestic hot water re-circulating pump: complete a PM work order semi-annually.

- Systems that start-up and operate continuously during the season, e.g., heating system and chilled water cooling system: complete a PM work order at start-up and shutdown.

Unscheduled PM work orders should be completed whenever a pump has a problem, e.g., excessive vibration: take advantage of completing the work order in sync with trouble-shooting the pump problem.

If the building does not have a PM work order system, whether manual or automated system, a pump PM work order should be created and used each time a pump is serviced in the future. Refer to our August 2019, [“What a Preventive Maintenance Work Order Includes”](#) column to guide one in creating the pump PM work order template.

Tasks that should be on this form are:

- Perform “lock-out/tag-out” of pump starter
- Shut off electrical power at local disconnect where applicable
- Open water blow-off valve to clear strainer filter or.....
- Close shut off valves upstream and downstream of strainer to remove strainer filter
- Inspect pump casing, pipe, fittings, and valves for damaged insulation
- Inspect assembly for rust
- Inspect assembly for water leakage
- Lubricate and grease motor and pump assemble grease fittings
- Check that the motor, shaft, and impeller casing alignment
- Check pump for vibration and unusual noise, e.g., air at pump casing from open system cavitation
- Inspect wiring for damage or loose connections

- Exercise automatic control functions, e.g., float switch turns pump “on”
- Exercise automatic controls, where applicable, under emergency power generation
- Record motor running amps and rated amps

### Maintain In-House or Contract This Requirement

With each of the above tasks, facility management should have made the determination, and provided the training, so that the pump maintenance can be completed by in-house maintenance personnel. Normally this type of work does not require a maintenance service provider. The maintenance personnel may be assigned to be on-site full time, or facility management may choose to have a “mobile” maintenance staff to complete the routine PM work. A “mobile” unit can be one or two maintenance technicians assigned to a specific number of buildings that do not have full time staff to operate and maintain the facility. In this case, the “mobile” unit would have a service van, equipment with the parts, material, operation and maintenance manuals, and asset data sheet/PM work orders to complete their required work.

The PM personnel will need to be trained in seasonal system start-up and system shutdown of pumps because, an outside service contractor should not be needed as it pertains to water pumps. On the other hand, a service company could be under contract to provide 24-hour emergency response, especially for 24-hour occupied building heating systems, e.g., healthcare facility. The service companies will have on staff, skilled technicians and certified technicians when required. And, when notified, they will bring the necessary materials, tools, and equipment to complete the maintenance.

In closing, it is important to note that the phrase, “preventive maintenance” work order doesn’t prevent anything from failing. It can be better defined as “planned maintenance” work order because no equipment lasts forever but, proactive maintenance can maximize the useful service life of the equipment, as well as keep it operating efficiently.

Two useful guides to preventive maintenance are the following web sites:

[https://www.gsa.gov/system/files/GSA%20PBS%20Preventive%20Maintenance%20Guide%202022-01302023\\_0.pdf](https://www.gsa.gov/system/files/GSA%20PBS%20Preventive%20Maintenance%20Guide%202022-01302023_0.pdf)

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*Howard McKew is a registered engineer and president of Building Smart Software. Howie has a ton of experience to draw from the various industry jobs he's held and often writes about that experience in his columns in Engineered Systems Magazine. He is the author of 3-books, contributor to other author's books, lectures, and is an active member and Fellow in ASHRAE.*

[www.buildingsmartsoftware.com](http://www.buildingsmartsoftware.com)  
[hmckew@bss-consultant.com](mailto:hmckew@bss-consultant.com)

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For more information:  
[facilities@dioceseofcleveland.org](mailto:facilities@dioceseofcleveland.org)

