

A Chiller Maintenance Program

Cooler temperatures do not necessarily bring chillers to the top of the mind, but as the seasoned HVAC professional knows, it is an ideal time to complete chiller maintenance and cleaning. Taking the time to care for the chilled water system makes start-up in the spring even easier and helps to prevent headaches and unplanned costs.



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There are plenty of excuses for delaying chiller maintenance, ranging from the cost, lack of time and not wanting to interfere with ongoing operations. But there are many reasons to make this a priority in facility management. One of the top reasons is that deferred maintenance can end up costing more in the long run if the repairs are even larger or equipment needs to be replaced.

Properly maintained equipment does more than help minimize breakdowns or downtime. Chillers are one of the largest consumers of a facility's energy, which is why chiller cleaning is key for efficient operations and sustaining productivity.

The U.S. Department of Energy estimates chillers are expending up to an additional 30 percent in energy through inefficiencies and recommends that certain chiller maintenance operations be done at least once a year, including both cleaning and Eddy testing of condenser and evaporator tubes. These inefficiencies can have a big impact on the bottom line. Whether your facility utilizes a closed or open system, a dirty chiller has to work harder, requiring more power and increasing energy costs.

According to a survey conducted by a leading manufacturer of industrial maintenance solutions, nearly 89 percent of the 255 respondents indicated that chiller maintenance at their facility is performed once a year. Sixty-four percent said they typically perform the maintenance between January and March. Over half of the respondents conduct Eddy current testing with 57 percent checking the tubes for flaws after cleaning the chiller.

Effectively Cleaning Chillers

Chiller tubes are susceptible to the buildup of scale and other sediments and residue, including mud, slime, sludge and algae. Periodic cleaning and maintenance helps control the growth of Legionnaires' disease bacteria (LDB) and other organisms that create potential health risks and impacts the building's indoor air quality.

There are large amounts of tubing in a chiller's heat exchangers so keeping the tubes clean means the chiller will perform more efficiently. The rate at which the tubes become clogged can vary with the type of system as well as

with water quality issues. Closed systems may not need to be cleaned as often while chiller manufacturers typically recommend periodic inspections for open systems to determine when cleaning is required.

When tubes become packed solid with deposits, a rotating brush and water flush with a tube cleaner removes the buildup and cleans clogged tubes quickly. Liquid descalers can also help. Using the right tools will soften heavy deposits and remove all the buildup.

Signs that your chiller condenser tubes may be clogged or have scale buildup include:

- An increase in the condenser outlet temperature. For every one-degree increase in the temperature of the outgoing condenser water, the chiller efficiency decreases by up to two percent. The culprit is typically scaled tubes.
- An increase in refrigerant approach temperature, indicating deteriorating chiller efficiency, usually due to scaled tubes.

What Tools Are Available?

There is a variety of chiller tube cleaning equipment and accessories that are simple to use, portable and can be easily operated by one person. Water treatment alone will not keep tubes clean. Even the smallest amount of scale can lower chiller efficiencies. Regular cleaning and inspections should go hand-in-hand with water treatment. Research your options to find which equipment will provide a solution for your chiller maintenance needs and meet your budget. There are a few tools that will help you perform the optimum chiller cleaning

- Rotary Tube Cleaner—Ideal for cleaning the tubes, these units feed water to the cleaning tool, flushing out deposits as they are loosened.
- Chemical Descaler—Chemical descalers can dissolve calcium, lime, rust, lithium carbonate and other types of deposits from passages that come into contact with hot water. Make sure to review the label to see what materials the descaler can be used with.
- Brushes—Attaching brushes to the tube cleaner can help remove soft and light scale deposits.

Steps to Improve Your Chiller Maintenance

A chiller maintenance plan or checklist is an ideal way to proactively stay on track and make sure your equipment is running efficiently and properly. Pull together a team of individuals involved with performing facility maintenance and discuss what steps should be taken to reach optimal performance.

- Step 1: Maintain a Daily Operating Log—The Federal Energy Management Program (FEMP) recommends updating the log four times a day to monitor key operating parameters that will help indicate if any problems are developing.
- Step 2: Keep Tubes Clean—Fouling and scale can reduce efficiency. Regular monitoring can help recognize when tube cleaning should take place; however, it is recommended at least once a year. Pressure loss can also indicate tube corrosion.
- Step 3: Ensure a Leak-free Unit—Leaks can affect the operation of the system and release hazardous refrigerants.
- Step 4: Sustain Proper Water Treatment—Failure to perform chiller maintenance can also affect water quality. Keep a close eye on water treatment and chemistry.
- Step 5: Analyze Oil and Refrigerant—Refrigerant levels should stay within the manufacturer's recommended levels. An air-purge timer (increases in air-purge time may indicate a leak), checking the refrigerant sight-glass for bubbles, and checking at all joints and connections with a gas analyzer are all ways to help track refrigerant levels.

Keep Everyone Informed & Measure Results

After developing a chiller maintenance program and outlining all the steps and action items, there is one final step to implementing a successful chiller maintenance plan. The program will only work if all the necessary parties are informed of the process and have received training on the system. Share the information with everyone who is involved in facility management or comes in contact with the system. Regularly provide updates on the positive results and impact of the routine maintenance to show the benefits.

Since chillers are one of the largest operational expenses in a facility's HVAC system, measuring efficiency gains can show facility managers important information, such as costs saved as a result of regular maintenance. A proper operating log can also help identify areas that show improvement following chiller maintenance.

Start the new year off right with a chiller maintenance plan!