

Breathing Easier On Coil Maintenance by David Kozlowski

PM for the 'lungs' of HVAC systems ensures trouble-free operation and greater energy efficiency

If the water or refrigerant in a heating, cooling or refrigeration system is the lifeblood of an HVAC system, then the coils are the system's lungs, exchanging heat instead of oxygen and carbon dioxide.

The efficiency of this exchange depends on a number of factors that can have a significant impact on a coil's capability to exchange heat. Most of the problems with coil performance stem from dirt and corrosion. Keeping these two factors at bay could bring years of trouble-free operation for every coil from refrigeration units to chilled water systems.

Locating problems

Most coils are made of copper or aluminum, and they often have fins to further improve heat transfer. Manufacturers choose to use these particular metals because of their heat-transfer capabilities. Their potential to transfer heat, however, can be reduced substantially if the tubes are corroded or dirty. Catching any build-up on the coils early is important.

"We inspect the coils quarterly as we are changing filters," says Charles Morgan, who is assistant director of maintenance at Tuskegee (Ala.) University.

Bill Hogan, HVAC foreman at Kennesaw (Ga.) State University, adds that it is important at that time to not only check the tubes but also to comb the fins to keep them straight. This step maximizes the fins' ability to exchange heat.

Morgan also checks any pressure test plugs installed for corrosion. The plugs with galvanized nipples can corrode.

Regularly cleanings are also recommended. In some environments, such as large urban areas that are subject to smog or are along the ocean, technicians might need to clean coils frequently to prevent serious corrosion problems.

A hose to spray on a non-acid cleaning detergent and rinse it off is usually all that is required. Another method is to spray the cleaner directly on coils after they have begun to collect condensation. This procedure allows the sweating tubes to rinse off the detergent. Some managers also have had success using a mild soap, such dish soap.

Some managers use small pressure washers. If technicians have access, they also can back-flush the coils.

The final procedure would be to clean out condensate pans and, if necessary, add an antibacterial agent.

Preventing corrosion

To prevent exterior corrosion, managers can specify coated coils or field coat them. Factory-applied coatings offer some advantages, such as more consistent coverage. But field-applying coatings can be effective if done properly. One coating manufacturer suggests running the fan and spraying the coating in to the coils, allowing the air to distribute the coating.

Jim Mitchell, HVAC mechanic 11 at Children's Hospital in Los Angeles, says the ocean has played havoc with his system's coils, particularly his aluminum coils, and coating them has helped a great deal.

Tests have shown that where corrosion and residue buildup are a problem, coating tubes can increase heat transfer capabilities by 55 percent after two years, compared to uncoated tubes, according to Thomas A. Westerkamp, a maintenance management consultant. Repair costs on uncoated tubes also can be up to 200 percent higher than repairs on coated tubes, Westerkamp says.

Mitchell adds that using moisture-eliminating filters as prefilters has been helpful. While they require more frequent changing, he says he has seen some benefits to using them.

Managers also must make sure coils are not only clean on the outside but clean on the inside.

To keep the interior of closed-loop coil tubes clean, technicians must maintain proper water chemistry.

"When we see a change in water chemistry, we start looking for a problem," Mitchell says.

Water also should be checked for signs of discoloration and residue.

"From time to time, we flush the system and then check the color and residue makeup of the water," Morgan says. The presence of either of these conditions could indicate internal corrosion, he says.

Another way to determine the condition of the coils is to measure and monitor their performance. Most chilled water systems have metered makeup loops to help monitor how much water is added to the system.

With the cost of water to facilities going up in many areas of the country, the amount of makeup water can be a significant bottom-line issue.

"Every closed loop we install has gallon meters on it," Mitchell says. In California, that is a necessity because of the high cost of water, especially in the Los Angeles area. Another way to monitor performance is to check the temperature across the coil. Hogan does this four times a year as part of a PM program.

David Wissmann, HVAC foreman at San Antonio (Texas) College, uses air sensors to monitor discharge-air temperature, and any significant change over time would indicate heat-transfer problems and possible build-up of corrosion or residue.

First line of defense

The first line of defense against coil performance is the filtration system. Regular filter changes will go a long way toward preventing coils from gathering dirt.

Visually inspecting and changing the filters at least two times a year is important. And where there is room to install them, prefilters help hold down the replacement cost of main filters.

Besides a visual inspection, technicians can check filters by measuring for drops in air-side pressure.

Any given facility might contain hundreds of coils, but the necessary maintenance on these key components takes a relatively small amount of staff time. And, more importantly, coils' efficient operation is essential for comfort and a healthy bottom line for facilities.

Filtering The Filters

You've heard of pre-filters. But how about pre-prefilters? Bill Hogan, HVAC foreman at Kennesaw (Ga.) State University, uses polyester fiber filter material, which comes in rolls that are 6 feet wide

by 100 feet long. He wraps the front of his air handling units and other equipment that houses filters and coils.

The material he uses has a filtration capacity of 35 percent, but it is available in various capacities. He cuts the material and wraps it around the filter area, and he changes it about four times a year. This method has allowed him to reduce the replacement cost of his final filters, and he says he doesn't even have to change his pre-filters as often.

He also uses the material to wrap coils in kitchen equipment, such as ice machines and refrigeration units. Because the coils tend to collect dust and dirt, they had needed regular cleaning, which often meant closing down the kitchen. Now, using the filter material, the coils not only need less cleaning, but when they are cleaned, he says his staff can simply vacuum them off. The cost for a 100-foot roll is about \$60, he says.

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