

Evaporative Cooling Preventative Maintenance Checklist

- Reduce the number of on-off cycles
- Shade the pads and sump
- Dry the pads out completely once every 24 hours
- Maintain a suitable water bleed off
- Drain and disinfect the entire water distribution system quarterly
- Avoid harmful contaminants, including dust, fumes from harsh cleaners, and water treatment chemicals
- Run the recommended quantity of water over the pad
- Avoid dry areas on the pads
- Stop annoying leads in the water distribution system
- Clean the water filters regularly

On - Off Cycling of the Pads

Many people have reported better control of temperature and humidity from evaporative cooling pads when the water is cycled on and off with a timer. Often, a ten minute timer is used with the “ON” time set between three and seven minutes. These timers should **not** be used.

With these timers, the pad is forced to Wet and Dry six times per hour and up to one hundred and forty four times per day! Like any other piece of equipment, every cycle shortens its life. Why? Because the minerals and chemicals in the water dry on the surface of the pad when the water evaporates. It is the most concentration when the pad is almost dry. It is very important to keep the concentration of these chemicals as low as possible by maintaining an adequate flow of water over the pads.

Each type of pad has a recommended quantity of water for best operation. This water flow will provide a protective coating on the surface of the pad. Only a small portion of this water will actually evaporate. The remainder of the water will continually flush the pad.

The pads should, however, be allowed to dry out every 24 hours while the air flow is running to help curb algae growth.

Methods of Controlling Scale

Scale and mineral deposits form on the face of the cooling pad because the mineral content in the water is too high.

- Increase the flow of water over the face of the pad
- Make certain the flow of water is even from one end of the distribution pipe to the other.
- Clean and flush the distribution pipe regularly, especially if dry areas appear on the face of the pad.
- Maintain the pH of harder water between 6 and 8
- Use plenty of bleed-off water

Controlling Scale and Dirt in Evaporative Pads

Water Distribution

Proper water distribution is the single most important way of prolonging pad life. The water will flush away dirt and contaminants which may be harmful to the pad. Areas “starved” for water will often be the first to clog or soften.

- Check the pressure in the distribution pipe. Most distribution systems consist of a perforated plastic pipe with holes directly at a splash plate. If the pressure is too low, the water will not break up at the splash plate or distribute correctly. Streaking and dry areas will occur.
- Check for adequate water flow.
- Adjust the flow until there are no dry streaks. When the pads are operating properly, they will be thoroughly wetted with a visible flow of water trickling down the flutes. Most of the water will pass over the pad and return to the sump. If there is little water running out the bottom of the pad, the dirt and minerals are not being flush properly.
- The distribution pipe must be level. If more than one pad wall is fed by the same pump they must be carefully balanced with valves. The distribution pipe

operates at a relatively lower pressure. When the cover is removed to expose the pipe, notice that the water jets only a few inches into the air. If one end of the pipe is lifted, the flow at the high end decreases.

- Check for clogged holes in the distribution pipe. The simplest way to clean the holes is to install a ball valve or threaded end cap at the end of each distribution pipe. While the pump is running, open the valve and allow the water to directly flush debris from the pipe. Usually, the first signs of a blockage will be at the end of the pipe farthest from the pump.
- Never locate the holes on the bottom of the distribution pipe. If so located, the holes are guaranteed to clog with silt from the bottom of the pipe.
- Clean water filter often. A dirty filter will substantially restrict the water flow. Install a ball valve on the cleanout for the filter. This way the filter can be flushed without tools and without shutting off the pump.
- Make sure the pump is large enough. The pump should be sized to supply a certain amount of water at a specified pressure. Besides lifting the water from the sump to the top of the pad, there are other pressure losses in the system. Friction losses in the pipes, elbows and valves consume between 3 and 5 psi (6.9 to 11.5 feet of pumping head). A clean, in-line filter will use another 5 to 10 psi the pump's pressure (11.5 to 23 feet of pumping head).
- Required water flow for various pads:
4" corrugated pads 0.50 GPM per linear foot,
6" corrugated pads 0.75 GPM per linear foot.

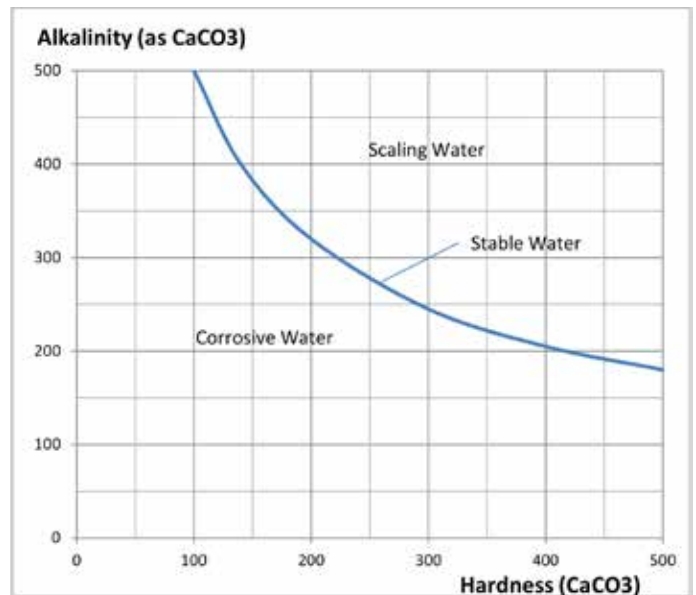
Common Scale Forming Materials

- Calcium Carbonate
- Calcium Sulfate
- Calcium Phosphate
- Iron Oxide
- Silica (SiO₂)

In most systems, calcium carbonate and silica are the most troublesome of scale formers. Silica is the most straightforward. It must be kept at a concentration less than 150 PPM.

Calcium carbonate scaling is more dependent on alkalinity (an indication of pH). Its solubility can be

simplified to a curve of calcium carbonate concentration versus alkalinity. On the chart, notice that stable water is represented by the narrow line. Water quality to the right of the line forms scale. Water to the left of the line is scale dissolving or corrosive. It is difficult to keep water perfectly balanced. Instead, try to keep the water reasonably close to the line so that it fluctuates between scale forming and scale dissolving.



Cleaning the Sump and Distribution System

When water evaporates, only pure water is released. The dirt and harmful chemicals are left behind with the water on the pads and in the sump. Eventually, the water becomes so contaminated that it is harmful to the pad and gutters.

- Quarterly cleaning and flushing of the pads will increase their service life.
- Completely empty the sump of water and silt
- Clean all remaining silt from bottom of sump.
- Refill with clean water
- If possible, turn off moving air.
- Manually turn on the pumps to run fresh water over the pads for about 30 minutes. Use as much water as possible.

- Open the ends of the water distribution pipes to flush out debris which could clog the holes. Replace the covers when done. When using silt collection, remove plug and drain from system.
- Gently hose stubborn deposits from the face of the pads.
- Completely empty sump to remove old algae and dirt which was just rinsed off the pads.
- Disinfect system by adding approved chemical.
- Check to make sure the bleed off is still functioning properly.
- Refill with clean water.

Cleaning the Sump and Distribution System

Algae needs three elements to survive:

1. Light
2. Moisture
3. Nutrients.

Shade the Pad and Sump

Algae only needs sunlight for a few hours each day. If sunlight can be minimized, the growth period will also be shortened. Remember to cover the sump. Algae may be growing there, too. Locate pads or protect from sunlight.

Cover the sump to keep out dirt and light. Do not use clear or translucent hoses, pipes, tanks of water distribution systems.

If inlet louvers are used, a dark color will reduce the sunlight.

Allow Pads to Dry Completely Once Every 24 Hours

Algae cannot live when it is bond dry. Regular drying of the pads for several hours at a time will stop algae from growing. Minimize the number of drying cycles, though. Too many cycles will weather the pad. During the cooling season, they should cycle once each day.

Set automatic controllers so the water to the pads turns off before the air flow is stopped. Pad pumps should be turned off first.

Do not allow the bottom of the pads to set down in water when the system is not running. Adjust the float valve and overflow after the system shuts down and all of the water returns to the trough.

Minimize Nutrient Contamination

Algae feeds off the nutrients in the water and air, not from a “good” cooling pad. Look for sources of nutrients and try to eliminate them.

Nearby farm fields and roads contribute dust and fertilizer which can be drawn through a lower efficiency filtration system into the pads.

When cleaning pads, remove from the pad wall. Old algae growth should be cleaned and removed from the system. When the pads are cleaned, algae are usually flushed into the gutter and go back into the sump. If not removed, it will serve as a nutrient for the next crop of algae.

Do not use phosphate type scale control agents or detergents on the pads. They degrade to form phosphate type nutrients.

Understanding Corrosion of Metal Evaporative Cooler Components

There are four major forms of corrosive attack to evaporative cooling equipment.

Pitting is the removal of metal at the surface in small, localized sites. These sites start out as inconspicuous flecks of rust or oxide, and eventually eat their way through gutters and pans in saucer like depressions.

Pitting is usually caused by the presence of copper, sodium chloride, sulphur and other strong contaminants in the water. The chemicals in a droplet of water are the most concentrated as the droplet dries. Avoid wetting and drying cycles, splashing and dripping where water can become concentration.

Crevice corrosion occurs in lap joints exposed to air and moisture. For aluminum and galvanized steel, oxygen must be present for corrosion to occur. For stainless steel, oxygen will help form a protective layer on its surface.

To avoid this form of corrosion, joints should be well caulked with a caulking compatible with the metal. Read the label carefully and contact your cooler manufacturer for recommendations. Notice that some caulks should not be used with certain metals.

Galvanic corrosion occurs when dissimilar metals are used in the same system. Even when they are not touching, the corrosion can occur through the water.

Avoid mixing aluminum, stainless steel and galvanized steel in the same system. Pay special attention to pumps, screws and valves. When metals must be mixed in the system, the odd metal should have a heavy protective coating, and transition joints should be used.

Poultice corrosion is due to contact with nonmetals. It may cause some serious problems. Materials such as cork, wood, cloth or paper provide moisture and air which contribute to corrosion. If they have been treated with a certain fire retardants or biocides (such as copper arsenite) the attack could be very severe. To prevent attack, coat the metal surface, or keep the porous material from becoming wet.

Use Protective Treatment on the Leading Edge

The leading edge of any evaporative cooling system is exposed to the harshest and highest velocity of contaminants. The first 1/2" of media gets more hot dry air and is where the highest evaporation takes place.

- Use of a wetting agent spreads water over edges as a thin film.
- Tough resilient edge provides protection against erosion of airborne particulates.
- Quick drying surface inhibits algae growth.
- Recommended to extend overall life of cooler media.