# HOSHIZAKI TECHNICAL SUPPORT
# TECH -TIPS

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***WATER COOLING-TOWER APPLICATIONS***
***By Lonnie Clayton*** So, you have a Hoshizaki water-cooled unit that is going to be installed on a cooling tower. Great. You're electrical went in without any trouble. You're potable water supply installation provided no obstacles. Now you are ready to connect the water-cooled condenser into the cooling tower loop system.

When installing a Hoshizaki ice machine on a cooling tower there are a few engineering criteria guidelines that must be met. They are:

- The water supply to the condenser should not drop below 4 gpm.
- The pressure differential between the inlet and outlet water lines must be no less than 10 psig.
- The water inlet temperature should not drop below 45 ºF.
- When using a glycol blend, the solution mixture should be less than 30% glycol.
- Once running, the water condenser outlet temperature must meet manufacturer specifications to maintain the proper high side pressure. (Reference Tech-Spec's pocket guide for model number settings).

Let's look at the first guideline. Without proper water supply, the condenser will starve for water. A pressure gauge and a flow meter can provide valuable information when installing and trouble shooting the water circuit. If the condenser is starving for water, the refrigerant pressure in the condenser will increase to the point that the system shuts down on high-pressure safety. To prevent this, install a minimum ½ inch water supply line to the condenser and provide an operating pressure of 10 ~ 113 psig.

Second: The pressure differential is crucial to disposing of the water leaving the condenser. Without this differential, water flow through the condenser will be slowed causing a drop in efficiency and production. This may cause the unit to shut down on the high-pressure safety. On some tower installations, it may be necessary to install a return line pump and pressure by-pass valve to maintain the minimum 10-psig pressure differential. A pressure gauge on the condenser outlet water line combined with a condenser inlet water line gauge will allow you to monitor the differential.

Third: Most cooling towers supply a water temperature range between 35 and 50 degrees Fahrenheit. We must take note that the factory recommended operating range is 45 to 100 ºF water temperature. Operating in this range provides maximum production from the equipment.

Fourth: Some cooling towers use a glycol solution. Proper maintenance of this solution is critical, as too much solution could cause congealing inside the condenser under certain conditions, slowing the flow of fluid through the condenser.

Fifth: Once up and running we need to check the condenser outlet water temperature to assure that it is set to the manufacturing specifications. In addition, adjustment of the water-regulating valve may be

needed to assure proper head pressure, and water outlet temperature.

The importance of preventative maintenance on a cooling tower is critical for the operation of all the equipment on the system. Without scheduled cleaning, scale, lime, and other minerals can develop on the walls of the water system. This build up of minerals will greatly reduce the production of the equipment and could result in equipment failure and, or high priced repair bills. To avoid these costly and frustrating situations set up the preventive maintenance schedule with the customer. Refer to Tech-Tip #114 for detailed instructions on cleaning water-cooled condensers.

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***F-450M BIN CONTROL***

The F-450MAF-C & MWF-C unit is designed for use with a counter top dispenser. During our preliminary development test, we found that the standard spout mounted mechanical bin control does not work well with a dispenser application due to ice packing in the spout. As a result, an infrared sensor is used. This control allows the unit to shut down before the spout fills with ice and eliminates the possibility of ice "choking" the spout opening.

The new control has three components. A separate power supply provides 24 volts DC to the infrared eye. This power supply is mounted in a separate control box along with the bin control relay. The IR sensor is mounted on the outside of the chute base in a molded indentation. Two mounting holes mount the sensor to the chute base.

The sensor has two LED lamps that light to show that power is supplied. Since the voltage is DC, the sensor is polarity sensitive. The sensor has four wires. The orange wire is capped off and not used. The black wire connects to the coil of relay X7. The brown wire is the positive lead and connects to terminal J2-1 on the power supply. The blue wire is the negative lead and connects to terminal J2-2. If these wires are crossed, the sensor will not shut the unit down. The result will be that the spout will fill with ice causing higher gear motor current and the gear motor protect fuse will blow. In this case, the bin control is the first component to check.

The sensor has two adjustments which are factory set. The first adjustment sets the operation mode of the sensor. It must be in the D position. The second adjust the operating distance of the infrared beam at approximately 4". It should be set so that the white dot on the dial is at 12 o'clock (top dead center). These settings should not be altered.

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***SERVICE Q & A:***

How does Reverse Osmosis water affect an ice machine?

R.O. water is very clean. To produce R.O. water, a extremely fine membrane is used. As the water is forced through this membrane, nearly all minerals are removed. The minerals are then flushed away from the membrane by a purge cycle.

An R.O. system usually produces low pH water. Water that is either very high or very low in pH can be corrosive. The pure water will actually strip away materials that it passes over as the water molecules grab for anything they can attach to. While additional minerals can be added to correct the pH, it may defeat the purpose of an R.O. system.

In the case of plated grid cell type evaporators, R.O. water can quickly strip away the plating leaving a bare copper plate that can be unsanitary. The KM evaporator has a stainless freezing surface, which will not be harmed by R.O. water however, the solder that bonds the serpentine to the plate can be effected. This corrosive factor will cause expensive evaporator damage.

If R.O. water is supplied to a flaker, the aggressive aspects will damage the seals on the roller bearings used by other manufacturers causing failures. On Hoshizaki flakers, it will wash away the surface of the carbon alignment bearings causing premature wear. Remember that bearing failure or wear can result in expensive auger and evaporator damage.

For the reasons listed above, Hoshizaki does not recommend connecting to an R.O. water system.

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***COMING NEXT MONTH...***

1. New DCM Control Board
2 Ice Machine Compressors
3. Service Q & A