HOSHIZAKI CARE
TECH-TIPS

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REVERSE OSMOSIS

There are many different types of water treatment systems available today. Due to the increased concern over the quality of water, Reverse Osmosis " R O " systems are more prevalent.

An RO system produces almost pure water with a pH well below 7.0. This water has been forced through a membrane under high pressure. The membrane serves as the filter media and has a pore size in the sub micron range. Due to the small pore size, the amount of water that will pass through the membrane is reduced. The rejected water is flushed down the drain. A ratio of three gallons of waste water to one gallon of processed water is common in producing RO water.

As the water is forced through the membrane, solids larger than the pore size are deposited on the membrane surface. At some point , the membrane surface loads up with solids and must be cleaned or replaced. In areas with a high mineral content in the water, more frequent cleaning is required. The final purity of the processed water will depend on the quality of the system and how well it is maintained.

The water produced by an RO system is extremely aggressive and is considered an active solvent. The low pH makes it highly acidic. RO water will attack most metals and plated surfaces. The RO process increases the galvanic action of the water which will shorten the life of rubber parts and can cause plastics to weaken. As you can see, this could cause problems in an ice machine.

Due to it's aggressive nature, Hoshizaki America Inc. does not recommend the use of RO water in our ice machines. If RO water is used the following damage could occur **:** Over a period of time, RO water flowing down the center of a KM evaporator could wash away the copper/stainless bond and cause separation of the evaporator plates. If RO water is used in a flaker, premature bearing wear and damage to the mechanical seal could result. Other ABS and rubber parts could also be effected. Any failures caused by RO water would not be covered by warranty.

Care should be taken in explaining the effects and discouraging the use of RO water in ice machine applications. Please advise any customers now using or planning to use RO water with Hoshizaki ice machines of these possibilities.

COMPRESSOR DIAGNOSIS

In this issue, we will discuss the electrical aspects of diagnosing single phase compressors. Hoshizaki uses CSCR type compressors in all single phase units. You will find the start relay, start capacitor, and run capacitor mounted in the unit control box.

A potential start relay is used. The start relay takes the start capacitor out of the circuit when the motor approaches normal running speed. The coil of this relay is parallel with the start winding. As the motor turns, additional voltage (back EMF) is generated by the start winding. Since the amount of back EMF is directly proportional to the motor speed, as the speed increases, so does the voltage. When the voltage reaches a certain

point (motor approaches normal running speed) the start relay energizes. This opens a set of normally closed contacts to take the start capacitor out of the circuit.

The run capacitor is wired across the start and run windings and causes a phase shift between the two. This phase shift improves the motor running efficiency, increases the power factor and reduces noise. Since the run capacitor remains in the circuit continuously, it always has a much lower capacitance rating than the start capacitor.

Compressor electrical problems fit into one of four categories. They are; No or low voltage, bad windings, improper wiring, and bad start / run components. To find which category fits your problem you must look at the symptoms.

If the compressor does not start when the unit sequence calls for compressor operation, you should first check for voltage across the common and run terminals. This voltage should match the name plate supply voltage +/- 10%. If the voltage is low or zero, check your power supply and contactor or compressor relay to assure the contacts are closed.

Once you have establish proper voltage across common and run, if the compressor still does not start, check the compressor windings for an open condition. This can be done by checking the winding resistance using a good quality ohm meter. The compressor terminals (marked C, S, & R) must be disconnected when checking the winding resistance. When disconnecting the terminals make note of the wiring color code and check it against the unit wiring diagram to assure proper wiring. Check for resistance across R & S with your meter on the high scale. If the meter reads infinity, the windings are open. A hot compressor should be allowed to cool and checked again. This will determine if the internal overload was tripped. If the meter shows e readable resistance, check between C & R, and C & S for readings within the specifications provided in the Technicians pocket guide compressor data section.

If the windings or overload are not open and voltage is present, the compressor should either hum or start. A compressor that simply hums will possibly shut off on internal overload or kick the unit circuit breaker. This can occur immediately or within a short time after the compressor starts. In this case, the windings should be checked for a shorted condition. With your ohm meter on the lowest scale, check each terminal to ground (compressor case or suction / discharge line). Any resistance reading between a terminal and ground represents a shorted condition. If the windings check OK and the unit continues to trip the overload or breaker, it should be checked with a "Hi Pot" meter for a weak winding which breaks down under a load.

A partial short between the windings or a start / run component problem will also cause the compressor to either hum or pull high amp draw and / or run sluggishly. A partial winding short would have been found when checking the winding resistance. A bad run capacitor will generally cause high amp draw. Check the amp draw with a clamp-on amp meter on the common lead. A bad start capacitor will cause the motor to hum or run sluggishly. The amp draw will be high and the overload or breaker will finally kick. Both capacitors should be checked on a capacitor checker to determine if they are weak or defective. A bad start relay may keep the start capacitor in the circuit continuously or not at all. Either will cause the same symptoms as a bad start capacitor.

We have discussed the major aspects of electrical diagnosis. Hopefully this will help you troubleshoot any CSCR compressor. Next month we will discuss the refrigeration aspects of compressor diagnosis.

P M REMINDER

Winter time is generally a little slower than mid summer around the refrigeration shop. This is usually a good time to conduct a few preventative maintenance checks for your flaker customers. Call them up and schedule a PM check. Advise them of the benefits of an annual cleaning and bearing inspection. They get the benefit of a more efficient operation and less down time when it is hot and heavy in the summer. You get additional service work. Its a win~win situation.

COMING NEXT MONTH...

1. Compressor Refrigeration Diagnosis
2. Huge Cubes
3. Inlet Water Valve Screen