HOSHIZAKI CARE
TECH-TIPS

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Volume 107
July 14, 1994

TXV Diagnostics

Thermostatic Expansion Valves (TXV) are utilized on all present production Hoshizaki Machines. Misdiagnosis of the TXV is common because the symptoms of a bad TXV are: low or no ice production, possible freeze-up, deformed ice cubes, partial or improper freeze pattern on the evaporator, long cycle times and flooding or starving of the evaporator.

Since the symptoms are similar to other failures these items should be checked thoroughly before condemning a TXV: check the water system to assure that the evaporator and distribution system are clean. Remember that lime or calcium scale is transparent when wet, so check the evaporator to assure a smooth clean freezing surface. Also check the inlet water solenoid for leak-by during the freeze cycle. This would add additional water to the reservoir and more evaporator load. The air cooled condenser must be clean and have proper air flow. A water cooled condenser must be clean and have adequate water flow and proper operation of the water regulating valve.

Other refrigeration system components should be checked. A liquid line valve which leaks by during harvest, a partial restriction in the system, a bad condensing pressure regulator valve (headmaster) or a low capacity compressor can cause symptoms similar to a bad TXV.

The refrigerant charge must be correct in order to properly troubleshoot the TXV. The refrigerant charge is critical and a high or low charge can cause the TXV to operate improperly. The proper refrigerant type and charge should be weighed in according to the name plate rating on the unit. Now
that we have covered items with similar symptoms, lets discuss the thermostatic expansion valve. The TXV operates as a metering device and feeds refrigerant to the evaporator. There are three factors which act together to open and close the TXV to supply the proper amount of refrigerant to the evaporator. These three factors are the sensing bulb pressure, the evaporator pressure and the valve spring pressure.

The sensing bulb contains a type “C” gas charge and is attached to the evaporator outlet using stainless steel clamps. The bulb should be mounted between the 10:00 and 2:00 position on the suction line. Always check the mounting and clamps to assure good thermal contact. A loose TXV bulb could cause liquid flood back, long freeze cycles or a possible freeze up. This could also cause a high pressure safety switch trip at the beginning of freeze. This would be due to excessive refrigerant in the harvest loop because the TXV does not close down properly during harvest. This excess refrigerant could cause a high pressure “spike” at the beginning of freeze to shut the unit down on the high pressure safety. This could occur intermittently depending on the operating conditions.

Hoshizaki uses non-adjustable TXV’s which are factory set by the manufacturer. In normal operation, as the water flows down the evaporator and is cooled and finally begins to freeze, the load on the evaporator decreases. As the load decreases, the suction line

temperature will decrease which in turn allows the bulb pressure to decrease. This decrease in bulb pressure allows the upward spring to begin closing the diaphragm, thus maintaining proper refrigerant flow. This is why suction pressure is higher at the beginning of the freeze cycle, then
gradually decreases as the cycle continues. If the TXV valve does not open enough, long cycles, and low production may occur. If the valve opens too much or does not close properly, flood back and possible compressor damage may occur.

On a KM cuber, check the frost line, freeze cycle time and ice fill on the evaporator to assure proper TXV operation. The frost line at the end of the freeze cycle will range from the suction line compressor connection to 1/2 the distance from the evaporator to the compressor. The normal freeze cycle time is found on the performance data chart in the KM service manual. You must know the exact inlet water temperature to read the chart correctly. Suction pressure (5 minutes into freeze cycle) and head pressure readings are also found on this chart. The normal ice fill will be from top to bottom and at the end of the freeze cycle. The last two passes will have slightly smaller ice cubes if the refrigerant charge is correct and the TXV is feeding properly.

Some units utilize multiple TXV's. In this case each circuit should be treated individually as a single pass circuit when troubleshooting.

On a flaker, the TXV maintains a constant suction pressure and evaporator temperature because the evaporator load is constant. The frost line will be consistent and within the same range as the KM cuber.

A quick check for a TXV that is suspected bad is to check the valve swing. To do this, check the suction pressure 5 minutes into freeze. Remove the TXV bulb and hold it securely in the palm of your hand for 2 minutes. Check the suction pressure and place the bulb in an ice bath for 4 minutes to check to see if the suction pressure swings at least 10 to 25 psi. A swing of 5 psi or less would indicate a weak TXV which should be replaced.

Hopefully the information provided here will help you understand TXV operation, symptoms and trouble shooting procedures, and assist you in future diagnosis on Hoshizaki equipment.

KM Pump Assembly

You Get What You Pay For!
How many times have you heard this statement. Well, taking a good look at the KM pump assembly will definitely bring this statement to mind. The KM pump assembly utilizes a Permanent Split Capacitor (PSC) motor. The capacitor is located in the control box. Using a PSC motor provides better starting torque and better running efficiency. The capacitor along with the dual winding also give us the capability of reversing the pump motor for the pump -out cycle. The motor has a thermal overload protector built into the windings and uses sealed stainless steel roller bearings which do not require lubrication.

The front end of the assembly is completely rebuildable. Four bolts or screws can be removed to access the replaceable impeller and mechanical seal. These parts are available individually for replacement if failure occurs. This is definitely not a throw away assembly, however, in case of a failed motor, the complete assembly should be replaced.

Providing this quality pump assembly and mounting the assembly is a dry compartment away from the damp/moist conditions in the evaporator section have proven to extend the service life of the KM unit.

Service Seminar Results

This is just a quick update on the 1994 Hoshizaki Training Season. We have completed out Spring Training sessions for this year. It is obviously hot outside and your Service Techs are working fast and furiously.

This year the Hoshizaki Care Department conducted total of 64 service seminars which included 2,760 Service Techs. We are presently gearing up for the Fall by updating our seminars and material. We look forward to seeing you at the next service seminar held

near you. Contact your local Hoshizaki Distributor to get your name on the seminar list.

Coming Next Month...

1. Compressor Checkout
2. CFC Update