HOSHIZAKI CARE
TECH-TIPS

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ICE QUALITY

Ice is a consumable product that serves a specific function. It's function, ... basic refrigeration. The amount of refrigeration effect that you get from the ice will depend on the quality of the ice. Ice quality is measured in % of hardness. Hardness is a measurement that represents the thermal cooling capacity. The higher the % hardness, the more cooling ability. Consider also that the harder the ice, the more dense it is and the longer it will last in a glass or a cooler.

Ice hardness is calculated by conducting a calorimeter test. This is a specific test used by ARI to rate ice quality or cooling ability. ANSI/ASHRAE STANDARD 29-1988 lists the procedure for conducting this test. The test requires an insulated container with a specific amount of water at a specific temperature. The ambient conditions for the test are also controlled. An exact amount of ice is stirred into the container and timed until the all the ice melts. The water temperature before and after the ice is added, and the actual melting time is listed on a data sheet. This information is used to calculate the ice hardness.

Water purity definitely has an effect on ice quality. Pure ice will be crystal clear. Cloudy ice usually contains air or minerals which will limit hardness. Ice is normally made available in either cubes, flakes, and cubelets. Customer preference and use dictates which type of ice is needed.

As ice is formed in a container, pure water freezes first. Any minerals or air trapped in the cold water will push towards the center of the cube and finally freeze. This will leave a cloud in the center of the clear cube of ice. You may have noticed this if you have ever used ice made in an ice tray in your home refrigerator. Cubes will fall in the 95 ~ 100% hardness range depending on the evaporator style and ice making process.

Commercial ice cubers circulate water over an evaporator plate. As the water circulates and is cooled, pure water freezes first. The minerals tend to "wash out" during this freezing process. The result is a more pure cube of ice. The ice hardness will vary with the style of evaporator and materials used. Any restrictions to the water path on the evaporator surface can slow down the water flow and allow minerals to freeze into the cube. Such restrictions occur when the water has to flow over a separator or into the cavity of a grid cell. These cubes may be cloudy and fall in the lower hardness range. The smooth stainless Hoshizaki evaporator provides the ideal cube making surface. The result, a crystal clear crescent cube.

As a general rule, flaked ice falls in the 70% hardness range. This is due to the freezing process used in the flaker. Water is frozen on a cylinder wall, broken away and extruded into the storage bin. Generally, all the water that goes into the flaker comes out as ice. Any minerals in the water will be frozen into the ice. Because of the nature of flaked ice, more air is present. This also reduces the overall hardness and cooling effect of the ice flakes.

Cubelets are made of compressed flakes. The flakes of ice are squeezed or extruded through a smaller opening to remove more water. This extruded ice is then broken into chunks or cubelets. These chunks fall in the

80 ~ 90% hardness range. Since cubelets are easy to chew, they are usually preferred by the health care industry.

CONTROL BOARD CHECKER

Good news!!! The Hoshizaki Technical Support Department has been working with the Engineering Department to develop a control board tester. As a result, we now have a small portable tester which can be used to verify a bad “Alpine” control board. The board can be tested either in the unit or on a work bench using a special power supply.

This month we will be shipping a tester and bench power supply to each Hoshizaki distributor. The distributor will check the warranty boards as they come in to verify if they are indeed bad. This will serve to reduce the number of good control boards returned under warranty.

I think you will agree that having the proper tools provides a more professional appearance for a service company. If you have an opportunity, check out the tester and give us some feedback. If we have enough interest in the tester, we will make it available to our service contractors at a nominal cost later this year.

SERVICE Q & A

Question: The cuber continues to shut down on the high pressure control. To my knowledge, no one has touched the refrigerant charge. What should I check?

Answer***: by Kirk Goss*** On calls that come into the Technical Support service line, I have noticed some confusion on how to properly diagnose a high pressure cutout problem. To properly diagnose the cause for this situation, we have to know at what point of the cycle the unit shuts down.

The easiest way to clarify this is to check for voltage on the control board at the K1. The number two pin is a pink wire. This is the power supply for the hot gas valve. If this circuit has power to neutral (the white wires), the unit is in harvest. If no power is present on the pink wire, check pin number three, which is black. If this circuit has power to neutral, the unit is in the freeze cycle.

If the unit cycles off on high pressure during harvest, check the control board, hot gas valve body and solenoid coil. On the control board, verify that it doesn’t drop power from the pink wire to neutral on the K1 connector. If it does, check to see if the power has sequenced to pin number three. If there is no power on pin number three and approximately ten seconds later the unit shuts down, the unit has a control board problem.

If the control board checks good, look at the operation of the hot gas valve coil. Does it have a strong magnetic pull? Is the coil winding electrically open ? Is there a bad connection from the control board to the gas valve coil?

A common problem with the hot gas valve is that with age, the magnetic pull of the coil gets weak as the coil heats up. This allows the hot gas valve to close (drop out) before the control board has switched into the freeze cycle. If the valve closes prematurely, the hot gas is diverted to the condenser, which forces liquid refrigerant through the TXV and begins to frost the evaporator coil. Since the control board has not yet cycled to freeze, the condenser fan is not running. This causes a high pressure shut down. On a water cooled unit, the high pressure forces the water regulating valve open. This causes the condenser to discharge water during harvest. The harvest time extends because the outlet temperature of the evaporator never reaches 48°F to start the defrost completion timer. The coil must be replaced if it gets weak. Note**:** A Sporlan #MKC-1 coil is a little large, however it will work temporarily until you can get the original part number 440353-01 coil.

If all of these areas are good, check to see if the valve body is sticking closed. On remote units, since the liquid line valve is not energized during harvest, the unit pulls into a vacuum if the hot gas valve coil is weak or the valve is stuck closed. Remember, you should always replace a sticking valve.

There is always a possibility of the unit being over charged before you were called in. If this a concern you should weigh in the factory specified refrigerant charge per the unit nameplate.

COMING NEXT MONTH...

1. Flake Size Adjustment
2. KM Thermistor Function
3. Service Q & A