



HOSHIZAKI TECHNICAL SUPPORT TECH -TIPS

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THE BATCH WEIGHT SYSTEM

During the original design process of the KM cuber, Hoshizaki engineers looked at several methods of ice production. For a cuber type icemaker, the batch-weight method stood out as the most efficient system. This design has several features that make it very efficient and provide for a longer unit life. In this article, we will look at those features and discuss their benefits.

The term batch-weight means that the KM has a large reservoir that will hold enough water in one filling, to make a full batch of ice. The KM evaporator also has more available freezing surface. The larger reservoir and freezing surface provide for a larger ice drop or batch weight per cycle. You will find that the batch weight for a KM model is usually 2 ~ 3 times that of our competition. This also results in a cycle time that is 2 ~ 3 times longer. The benefit, longer cycles equates to fewer cycles a day. Fewer cycles a day means that the components cycle less to provide the desired production. This produces less stress on the components and a longer operating life for the unit.

The KM reservoir is filled by an inlet water valve solenoid. The inlet solenoid allows water to enter the reservoir during the harvest cycle. The water is then cooled to 32°F and ice forms as additional latent heat is removed. No additional water will enter the reservoir during the freeze cycle. Other designs, add additional water to the reservoir after the batch water has reached 32°F. This warms the water in the reservoir and extends the freeze cycle time. Having to re-cool

the reservoir water reduces the efficiency of the unit considerably, especially in areas with higher incoming water temperatures.

Another advantage to the batch-weight system is the ability to easily purge and flush minerals from the larger reservoir. The level of water in the KM reservoir is established by the height of the drain standpipe. The incoming water is allowed to over-flow this standpipe at the end of every harvest cycle. This allows fresh water to flush and clean the reservoir, removing minerals and sediment. Additionally, a reverse pump-out cycle will purge the reservoir of mineral buildup at the beginning of every tenth harvest cycle. A unique control allows a technician to extend the overflow flush and add more pump-outs to provide more built-in cleaning. A cleaner reservoir reduces scale buildup, resulting in less maintenance and better efficiency.

As you can see, the batch-weight system improves KM efficiency and reliability. It definitely adds value to our Hoshizaki KM product design.

BYPASS COOLING CONTROLS

Bypass cooling is only found on units using R-22 refrigerant. The KM-500M and smaller units do not require bypass cooling due to the smaller compressor size. The KM-630/800MAE/MWE units use a straight capillary-tube that is connected from the liquid line to the suction line. The flash of refrigerant through this capillary provides continuous bypass cooling for the compressor.

The KM-630/800MRE and larger units include a bypass solenoid valve to stop the flow of bypass gas in the off-cycle or whenever on-demand bypass cooling is needed. The method of control for the bypass valve varies with the different models. The best way to determine what controls the bypass valve is to check the wiring diagram for that specific model. For example, if you look at the wiring diagram for the KM-630/800/1200/2000 remote, you will find that the bypass valve energizes with the contactor coil circuit. This provides continuous bypass cooling when the unit is operating. The valve closes in the off-cycle to eliminate the possibility of refrigerant migration.

The bypass valve for the KM-1200 air and water-cooled units is energized through N/C contacts in the bypass relay. The water valve circuit energizes this relay. The bypass valve will be energized in harvest only after six minutes, when the water valve is de-energized. Instead of providing cooling in this case, the bypass valve adds liquid refrigerant to the harvest loop in a long harvest.

The KM-1600 models have on-demand bypass cooling. A bypass control temperature switch will de-energize the bypass relay to provide cooling if the discharge line temperature exceeds 221°F.

Finally, the KM-2400SRE3 has a two-position liquid bypass control. This temperature control will provide bypass cooling in the freeze cycle in warmer operating conditions. It will also energize the bypass valve to add more refrigerant to the harvest loop in cooler operating conditions.

SERVICE Q & A:

Question: Recently, I removed the heat exchanger in order to install a suction filter drier, after a compressor motor burnout. Will this have an affect on my production?

Answer by Miguel Maldonado: Yes, it will. Hoshizaki installs heat exchangers on most of our KM series models. The function of the heat exchanger is to stabilize the refrigerant circulation against load variation. It helps to keep the refrigerant in the proper

state of either liquid or vapor. The heat exchanger is usually constructed by connecting the liquid line, which carries medium temperature liquid to the thermostatic expansion valve and the suction line, which carries the cold low pressure heat laden vapor to the compressor. These lines are connected together using low

temperature solder. A heat exchanger has three advantages:

1. By **sub-cooling** the hot liquid refrigerant, it increases and improves the operational efficiency in the system. The evaporator capacity increases and evaporator pull-down time is improved. As a rule of thumb, one degree Fahrenheit of sub-cooling results in a ½ % capacity improvement. It also improves thermostatic expansion valve operation.
2. A heat exchanger reduces **flash gas** in the liquid line. Flash gas (vaporized refrigerant) comes from sudden change of refrigerant from a liquid to vapor as it passes through the expansion valve. The heat exchanger will reduce valve capacity and cut down some of the loss in efficiency due to flash gas.
3. The heat exchanger also provides **compressor protection**. It reduces possibility of liquid refrigerant (droplets) returning back to the compressor. It also reduces pipe sweating and condensation which causes messy puddles of water that can find it's way back into the bin and contaminate the ice.

Removing the heat exchanger will have an affect on the production and extend the freeze cycle. Some re-piping on the refrigeration lines may have to be done in order to accommodate the suction filter drier. Hoshizaki engineers have specifically designed the length of the heat exchanger to provide the proper amount heat transfer. It is important that you never cut away any part of the heat exchanger. Caution should be taken when brazing to protect the heat exchanger from separation due to excessive heat. Use of a wet cloth or heat absorption paste is recommended.

Please note that Hoshizaki recommends that you remove the suction filter drier after 48 hours of operation. A new liquid filter drier should also be installed at that time.

COMING NEXT MONTH...

1. New Flaker Gear Motor.
2. DB-90 Dispenser
3. Service Q & A
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