HOSHIZAKI CARE
TECH-TIPS

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ALTERNATE REFRIGERANT UPDATE

As you know, the final ban on CFC's became effective January 1st, 1996. This put a halt to production of R-12 and R-502 which was used in early model Hoshizaki ice machines. All ice machines produced by Hoshizaki within the last 3 + years use R-22 refrigerant. This article will update you on our recommendations for retrofit of older equipment.

Retrofitting of refrigerants in older equipment is an expensive and time consuming process. It will require a change in lubricant and a thorough flush of the system. Remember, this equipment was designed for use with the original refrigerant. The unit will operate better with the original refrigerant than with other refrigerant alternatives available today.

Our recommendation on retrofitting is to hold off until CFC supplies are no longer available. At present, R-12 and R-502 quantities are readily available though the cost is up considerably. It is still less expensive to buy the original refrigerant than to go through with the retrofit process.

No one can say how long the current CFC supply will last. We realize that at some point in time retrofit will be necessary. When that time comes, we suggest you follow these recommendations.

Since Copeland and Dupont are our primary OEM suppliers we must rely on their recommendations for replacement refrigerants. Both companies have published retrofit instructions which are available through your local ARW wholesaler. We suggest you follow those guidelines when converting to the alternate refrigerants.

When it becomes necessary **to convert an R-12 unit use MP-39 (R-401A).** See Dupont Retrofit Guidelines number ART-5 or Copeland Changeover Guidelines number 93-02-R2 for detailed instructions.

It is important to note that alkylbenzene oil must be used with R-401A so an oil change is necessary. Also, the new filter drier must be compatible with this refrigerant blend. The refrigerant charge should be about 80% of the nameplate rating. The final charge may need to be adjusted slightly depending on the age and condition of the unit being converted. You will find that the suction pressures are slightly higher with R-401A. The high side pressures will be as much as 20% higher.

When it becomes necessary **to convert an R-502 unit use HP-80 (R-402A).** See Dupont Retrofit Guidelines number ART-9 or Copeland Changeover Guidelines number 93-05 for detailed instructions.

The oil, drier, and refrigerant recommendations will be the same as stated with an MP-39 conversion. Additionally HP-80 is a near-azeotropic mixture. It is important to assure that the proper refrigerant composition is charged into the unit. This can be accomplished by **charging only liquid** into the system. When charging, remove liquid refrigerant through the cylinder dip tube (if provided) or by inverting the cylinder. Charge through the high side access or flash to the low side of a running system using a throttling valve or liquid dispensing device to protect the compressor from liquid flooding.

No adjustments are necessary to the factory set TXV when using these recommended retrofit refrigerants. The pressure controls should operate properly under normal operating conditions. Once the conversion is completed, the unit production should fall in the range of the original published specifications. Be sure to mark the unit nameplate to reflect the new refrigerant type and place a new sticker over the old refrigerant sticker so that it is highly visible.

Lastly, we have been asked many questions about using other alternate refrigerants available in the market for retrofit. Our OEM suppliers have not approved other retrofit choices. These are our only choices at this time. If this situation changes, we will publish the information as soon as possible.

COMPRESSOR BURNOUT by Duncan Sheridan

As an ice machine technician, do we really care what causes a compressor to burn out? Do you enjoy clean up after a burnout? If the cause of burnout remains a mystery, guess what! To prevent repeat burnouts, every effort must be made to find the cause of the failure.

Let's take a look at what causes compressor burnout. Insulation breakdown causing a short circuit in the windings is usually the end result. But what causes the insulation to breakdown? This generally occurs because of overheating. Overheating can be the result of any of the following**:**

1. System operation outside the design limits..... Motors which continuously operate beyond the limits specified by the manufacturer will ultimately cause a failure.
2. Mis-wiring.... Obviously, improper wiring to the compressor can cause either a direct short or high amp draw leading to overheating.
3. Solid contaminates which might restrict refrigerant flow causing overheating.
4. Loss of lubrication can cause bearing failure. This causes additional friction, generates heat, and destroys the insulation. It can also reduce the clearance between the rotor and stator causing rotor drag and higher amp draw.
5. High compression loads can be caused by a system overcharge or loss of condenser cooling.
6. Flooded starts dilute or washout compressor oil.
7. Inadequate motor cooling due to high suction gas temperature, loss of refrigerant charge or excessive discharge pressures cause oil and insulation breakdown.
8. Contactor problems or bad start / run components create excessive heat through higher amp draw.

Motors which have burned may result in oil sludging and copper plating. Hydrochloric/hydrofluoric acids may form if the refrigerant breaks down. These acids attack and corrode metal and even the glass fusite terminal connectors. Acids react with the oil and metals weakening other internal components. Lacquers from the motor insulation loosen and flow through the system plugging strainers, driers capillaries and valve orifices.

Now that we have discussed what causes a burnout, you can see that a thorough cleanup is important to reduce the possibility of a repeat failure. In the next Tech-Tips issue we will discuss the cleanup process.

ICE USAGE GUIDE

This chart is a general rule when calculating ice needs.

Food service	Approximate ice per day	
	Cubed ice	Flaked ice
Restaurant	1.5 lb. / person	2 lb. / person
Cocktail	3 lb. / person	N/A
Water glass	4 oz / 10 oz glass	5 oz / 10 oz glass
Salad bar	35 lb. / cubic foot	30 lb. / cubic foot
Fast food	5 oz / 7-10 oz drink	6.5 oz / 7-10 oz drink
	8 oz / 12-16 oz drink	10 oz / 12-16 oz drink
	12 oz / 18-24 oz drink	15 oz / 18-24 oz drink
Lodging		
Guest ice	5 lb. / room	N/A
Restaurant	1.5 lb. / person	2 lb. / person
Cocktail	3 lb. / person	N/A
Catering	1 lb. / person	1.5 lb. / person
Healthcare		
Patient ice	10 lb. / bed	12.5 lb. / bed
Cafeteria	1 lb. / person	1.5 lb. / person
Convenience stores		
Beverage	6 oz / 12 oz drink	N/A
	10 oz / 20 oz drink	N/A
	16 oz / 32 oz drink	N/A
Cold plate	50% more ice / day	N/A
Bagged ice	lbs / bag x bags sold / day	N/A

Drinking establishments

Drinks 40% of cup filled with ice x # served / day

Note: Add a 20 % safety factor to accommodate for growth.

COMING NEXT MONTH...

1. Cleanup After Burnout
2. Flaker Water Fill System
3. KM Bin Control Extension