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# Refrigeration Equipment Maintenance

By Art Sutherland

At first glance, a refrigeration system for an ice rink can be an overwhelming piece of equipment. The myriad of compressors, controls, pumps, motors, valves, gauges, and various moving parts meld together into a potentially intimidating technological nightmare.

The bad news is that from the moment a refrigeration system is installed, it starts to wear out. The good news is that through proper maintenance your system should provide you with 30 years of reliable operation.

The first step to being able to provide safe and useful maintenance on an ice rink refrigeration system is to fully understand the system. This essential knowledge is gained through proper education. A professionally facilitated refrigeration operator's training program will pay for itself many times over in lower energy costs, reduced downtime, and increased equipment longevity. Through proper training, operators will be able to fully understand all aspects of the refrigeration system and to divide the system into its various sub-components for ease of trouble shooting.

One of the key elements in any preventative maintenance program is the proper implementation and upkeep of an equipment logbook. The logbook ensures that an operator is checking the equipment on a regular interval, usually every four hours. The logbook also provides a very useful long-term trend log of all operating conditions.

For instance, if your discharge pressure were increasing 1-psi per month it probably would never be noticed through cursory equipment inspections. However, if you were maintaining your equipment logbook and regularly checking prior operating conditions, a 12-psi increase would be easily evident over a one-year period. This increase in pressure could be due to scaling on the condenser tube bundle. If left unchecked, this condition would result in a six percent increase in your power bill and reduced compressor life as a result of the higher compression ratios.

When a refrigeration system is started for the first time it is important to record all of the operating conditions to form a baseline for future observations. The following are a suggested list of operating conditions that should be inspected on a regular basis. The conditions will vary from site to site depending on the size of the facility (one sheet of ice or more), the type of primary refrigerant (ammonia, R-22 or AZ-50), and the style of the system (direct or indirect).

Compressors:
Suction pressure
Discharge pressure
Oil pressure
Oil level
Discharge temperature
Temperature of all heads
Water temperature in and out
Condition of belts

Chillers:
Brine temperature in and out
Refrigerant level

Drain oil

Condensers:
Condition of coil
Spray nozzles
Belts Bearings

Pumps:
Condition of drive coupling
Condition of seal
Brine pressure

Brine:
Brine level
Brine strength
pH level

A good maintenance program starts with proper understanding of the equipment used.

* Editor's Note: Art Sutherland is a partner in Accent Refrigeration Systems and author of an ice skating facility operator's training manual.