

YEAR-ROUND HUMIDITY CONTROL FOR ICE RINKS - KENTWOOD ICE ARENA, GRAND RAPIDS, MICHIGAN

The Kentwood school system, outside Grand Rapids, Michigan, operates a multipurpose sports facility which includes a large ice rink. When the rink was built, operational plans called only for cold-season skating.

Over time, it became clear that economics favor year-round operation. Although the refrigeration system must work much harder during warm seasons, the income generated far exceeds the operational cost.

However, the excess humidity becomes a larger issue during spring and summer operations because it condenses on the cold ice surface, overloading the refrigeration system and reducing ice quality.

THE PROBLEMS

As moisture condenses on the rink, the ice softens and forms puddles until the refrigeration system can freeze the condensation. So, skaters get wet when they fall, and the refrigeration system operating costs rise dramatically.

High humidity also causes fog, obscuring the ice action and leading to safety problems. Excess moisture condensing on the roof structure causes dripping on spectators and damage to the ice. As well, the condensation causes deterioration of the building structure.

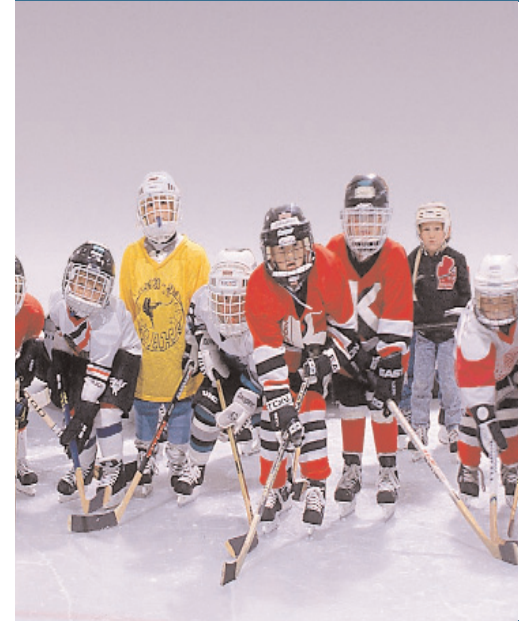
Year round operation required better dehumidification equipment, especially since concerns about indoor air pollution now force the arena operator to bring in more humidity-laden fresh air.

To address the problem, managers first installed a cooling unit which used some of the refrigeration capacity to dehumidify the arena. But the unit neither solved the humidity problem nor operated reliably, so a Munters IceAire desiccant-based system was installed to provide improved dehumidification.



At the Kentwood arena, a Munters DryCool IceAire dehumidification system eliminates excess moisture, allowing the rink to operate year-round and generate income continuously. Todd Bell, rink manager, enjoys the benefits of operating Kentwood with an IceAire System including: better ice, fresher indoor air, no fog and easier resurfacing.

DryCool Case Study: Kentwood Ice Arena, Grand Rapids Michigan



FACTS

By Installing the IceAire System, Kentwood Ice Arena has:

- \$25,000 Annual Cost Saving
- High-Quality Ice Surface
- Fresh Air Without High Humidity
- Fast Recovery From Resurfacing
- No Fog
- Reduced Maintenance Cost
- Improved Comfort for Customers

THE SOLUTION

After evaluating several humidity control approaches, the arena manager decided to install a desiccant system rather than any of the cooling-based alternatives.

The decision was based on several factors. Munters technology had an excellent track record in other humidity control applications. Also, the consulting mechanical engineer for the project identified significant cost savings through the use of the desiccant units.

Desiccant dehumidifiers remove water vapor by absorption rather than by condensation. With this process, air can be dried very deeply. Cooling systems condense water, so they freeze when air is too cold. Desiccant absorption removes more moisture from cool air, because the absorption process is not limited by the freezing point of water. The moisture is removed in the vapor phase eliminating frozen coils and overflowing drain pans.

Because the IceAire desiccant system removes moisture very efficiently at low humidity levels, it costs less to run. The table below shows the annual cost differences at Kentwood. Note that the cost to run the desiccant system is similar to the cost for operating the cooling system, but the desiccant system removes approximately three times the water vapor, which results in a major

cost reduction for the ice refrigeration when it operates in the desiccant-dry environment. The net saving is over \$25,000 per year in favor of IceAire.

THE ICEAIRE SYSTEM

The system handles a mixture of fresh air and air returning from the arena. Humid air passes through a rotating desiccant wheel, which removes the moisture. Then a fan delivers the air back to the arena. Even at peak summer design conditions, the IceAire system supplies air to the arena drier than if the temperature outside were 0°F. This exceptionally dry air allows the system to hold the arena at a condition of 40% rh all year long.

The IceAire system does not include heating or cooling components because those functions are performed adequately by the combination of the ice surface itself, and existing heaters mounted inside the space. Those heaters operate less frequently since the IceAire system was installed, because desiccants warm the air as they dry it. This provides another benefit during cool seasons, when dehumidification is still needed. Spectators and skaters enjoy the warm dry air from the IceAire system much more than the cold, satu-

rated air which was blown into the arena by the ineffective cooling-based dehumidification system.

BENEFITS

- *\$25,000 Annual Cost Saving*
By keeping the arena dry, the ice refrigeration system operates so efficiently that Kentwood saves over \$25,000 a year.
- *High-Quality Ice Surface*
With no excess humidity to condense on the rink, the ice stays hard even during summer months. Puddles don't form, so skaters stay dry and comfortable. And without condensation dripping from roof supports, no mushrooms form on the ice, so resurfacing requirements are reduced.
- *Fresh Air Without High Humidity*
Indoor air quality issues have received much negative attention in ice arenas. With Iceaire, Kentwood is able to bring in fresh air without the problems caused by excess humidity.
- *Fast Recovery From Resurfacing*
Since air is dry, the ice recovers quickly after resurfacing operations, so customers can skate rather than wait.
- *No Fog*
The familiar fog problems of humid seasons are eliminated when IceAire keeps the arena free from excess moisture. Spectators can fully appreciate the ice action, and skaters can enjoy a safer, fully visible ice sheet.
- *Reduced Maintenance Cost*
Without high humidity, the building structure does not corrode, and mildew does not grow on paint as in the past. So cleaning and repainting costs are reduced, and since insulation stays dry, it costs less to heat and cool the building.
- *Improved Comfort for Customers*
With a dry arena, there is no cold roof condensation to drip down the collars of spectators. The cold, damp experience of the past is gone. Fresh, comfortable dry air encourages customers to return, generating revenue while enjoying the enhanced skating experience.

Annual Savings at Kentwood Arena Using Desiccant Dehumidification		
	Cooling-Based Dehumidification 80% rh	IceAire Desiccant Dehumidification 40% rh
Electrical Demand Charges	\$7,300	\$1,400
Extra Humidity Load On Ice	\$19,400	\$0
Gas Usage Cost	\$0	\$5,200
Air Handling Cost	\$9,300	\$4,400
TOTAL	\$36,000	\$11,000
	Annual Operating Cost Savings \$25,000	



Don Cooley was so happy with the Munters IceAire System he installed at Kentwood Arena that he has purchased another IceAire for the new Patterson Arena in Cascade, Michigan which opened in the Fall of 1994.

Munters Corporation
Commercial Dehumidification Division
16900 Jordan Road
Selma, TX 78154
Tel (210) 651-5018 or (800) 229-8557
Fax (210) 651-9085
www.munters.us