

Comfort and Humidity Control

Going GREEN with Gas Cooling & Desiccant Systems

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In today's competitive foodservice market, delivering first-class hospitality to your customers by providing top-quality cuisine at a competitive price, served in a clean and comfortable environment is "the order of the day." So often, keeping your restaurant dining and kitchen areas at comfortable temperatures for customers and employees can be a challenging and sometimes difficult balance. Prior to the development of new cooling and desiccant technologies, restaurant operators had to make difficult choices whether or not to make seated customers happy by keeping the dining room temperatures high or keep the employees productive and comfortable by keeping temperatures low.

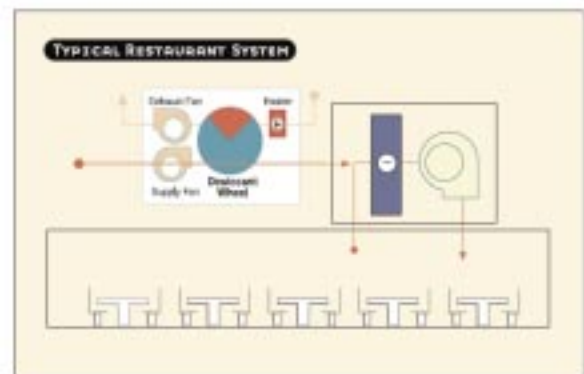
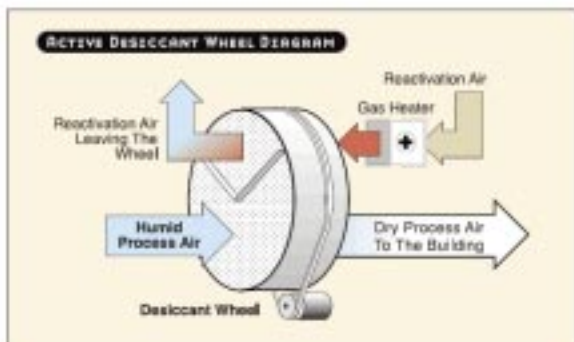
To make things more challenging, today's ventilation codes require operators to add more fresh air to dining areas, which can overload cooling units. This allows for increased internal temperatures and

humidity making your customers and employees uncomfortable. This article will focus on the "comfort factor" and how you can start going GREEN with gas cooling and desiccant systems.

As the "Green Movement" in America has grown, so has the search for alternative technologies to reduce the carbon dioxide that is expelled into our atmosphere and plays a major role in global warming. Reducing the amount of electricity used for common everyday tasks such as lighting, HVAC and water heating and replacing them with compact fluorescents (CFLs) and gas

heating/cooling and water heating will do much for reducing greenhouse gas emissions. Simply put, for every one kilowatt hour of coal-generated electricity that we reduce we can eliminate up to 1.5 pounds of carbon dioxide from the atmosphere. And that's where a natural gas air conditioning or desiccant

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dehumidification system will not only save you money but can create a more comfortable dining and work environment, all while helping to cut greenhouse gas emissions and slow down global warming!

Gas Cooling Technologies

There have been significant improvements with gas cooling technologies over the years with many systems now designed for smaller, compact facilities, such as restaurants and other foodservice settings. These high-tech systems offer several advantages over the more common electric-powered counterparts. Operators who make the switch to gas for this application are able to take advantage of the generally lower operating cost that only natural gas provides on a BTU to BTU comparison. And because less electricity is required to operate the system, you are cooling with a “greener” technology. In addition, peak electric demand charges are also reduced resulting in substantial operating cost savings. Gas cooling/dehumidification is available today in three basic formats: absorption, engine-driven, and desiccant wheel technology.

So, one may ask, what are these different systems and how do they work?

A natural gas **absorption air conditioning system** uses water as the refrigerant. The absorption process is explained in detail on www.gasairconditioning.org. The waste heat produced from this process can be recovered to provide domestic hot water for additional energy savings.

A gas **engine-driven system** operates like a conventional electric-powered system with one exception — it replaces the electric compressor motor with a gas-powered engine. The engine provides variable speed operation capability, higher part-load efficiency, and the potential for engine waste heat recovery for domestic hot water to enhance an operator’s bottom line.

And then there are **hybrid systems** that combine

the use of natural gas and electricity. This type of system is justifiable if electric demand and on-peak energy charges are high. In such installations, the natural gas chiller operates during on-peak periods to avoid the high cost of electricity, and the electric chiller operates during off-peak periods to take advantage of the lower cost of electricity. But, because of the simplicity and cost-effective advantage of today’s smaller, compact desiccant systems, we’ll focus the balance of this article on that topic and technology.

Humidity is the REAL Issue

A desiccant system removes moisture from incoming fresh air and keeps humidity low. That lets the operator raise the temperature for the comfort of patrons without making the employees too hot and less productive.

Simply put, gas-fired desiccant dehumidification systems reduce humidity in foodservice establishments by reducing the energy required for cooling. When humid air is cooled, about half the energy of conventional cooling systems is actually used just to dry the air. Desiccants dry the air separate from cooling it. The resulting clean, dry air produced by desiccants has been proven to eliminate frost buildup in the frozen-food section of supermarkets, reduce airborne spores and bacteria in hospitals, prevent mold and mildew problems in hotels, and improve

indoor air quality in offices and retail establishments. And the bottom line message is that by eliminating that “hot and sticky” feeling, desiccant systems allow restaurant operators to offer a more pleasant dining atmosphere for customers and a more comfortable working environment for employees.

The “old school” practice has been to overcool your restaurant in the summer, making patrons uncomfortably cold while trying to make things comfortable for servers and staff. A desiccant system removes moisture from incoming fresh air and keeps humidity low. That lets the operator raise the temperature for the comfort of patrons without making the employees too hot and less productive.

Gas desiccant dehumidification systems resolve these issues by pre-treating the air for the dining and/or cooking areas, “drying” it so humidity stays under control even on a warm and rainy day. When humidity is kept low, temperatures can be allowed to rise because the body can be kept comfortable by evaporation. Think about when you’re swimming and how cool you feel when you come out of the water...simple evaporation causes that cooling effect, and that is exactly what a desiccant system does. So with desiccant-dried fresh air, the working restaurant staff stays comfortable by normal evaporation. And your customers stay comfortable because they do not shiver and feel like they need a sweater on a warm summer day. And, improving the environment will keep those customers staying longer to enjoy desserts and specialty beverages, which can increase your bottom line. But most of all, they enjoy the comfort of your restaurant and will want to come back again and again.

Desiccant Technology Principals

Desiccant systems are equipped with a specially

impregnated wheel designed to remove moisture from the air. The desiccant “wheel” is then dried with heat created by a natural gas burner. This dehumidification provides for enormous capacity compared to cooling-based dehumidification. A desiccant wheel needs only to dry the incoming fresh air, rather than all the air circulating through the restaurant. This keeps installed costs to a minimum.

The desiccant units dry the fresh air so effectively that cooling coils in the AC hardly ever condense moisture. That means that the cooling units have a higher sensible cooling capacity, so they can control temperatures more accurately even when the heat loads are very high. Meanwhile, the desiccant units have the capacity to keep humidity below 60% even during hot, rainy weather — when unassisted conventional systems could create cold and clammy or even hot and sticky conditions, annoying both customers and staff.

While the conventional air conditioning system is controlled with a thermostat, the desiccant units are controlled by a humidistat, which cycles the reactivation energy to match the unit’s capacity to the varying moisture load from the air outside. For



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removing moisture, gas-powered desiccants cost less than electric-driven cooling. So a desiccant system can save an operator meaningful dollars while providing a more comfortable restaurant environment.

Size Reductions Simplify Installation & First Costs

In addition to larger rooftop-mounted systems, technology improvements have resulted in compact units that are more suitable for today's foodservice operations. These smaller systems are designed with first cost in mind and are generally less expensive and can fit more easily into an operator's budget, especially when it comes to retrofit applications.

These smaller systems are designed to fit above most drop ceilings and process the return air only. The existing rooftop HVAC units work in conjunction with these in-line units to continue processing any outdoor air and "conditioning" the indoor temperature of the restaurant. A simple humidistat inside the restaurant cycles the units based upon the humidity set-point. With this independent control of the building humidity, the temperature can be increased for more improved comfort and energy savings. Remember, humidity is the real issue, so with less humidity as a result of this desiccant system, a higher indoor temperature still means comfort at less cost than that provided by total conventional air conditioning.

A domestic manufacturer of these new smaller systems has exhibited positive results with national chain operators in several Southeast markets. Typically these store sizes will call for two in-ceiling mounted units at an installed cost of less than \$10,000 for a complete system. One of the chain's objectives was to eliminate the "rainy window syndrome" and promote quicker drying of floors to prevent employee slips and falls. This has resulted in a safer work environment and has made the restaurant more visually appealing to customers.

Bottom Line Benefits

- **Mold Prevention** — ASHRAE studies show that mold and mildew growth is eliminated when the humidity is maintained at 45 - 50% relative humidity.

- **Reduced Damages** — Restaurant applications have shown to prevent windows from sweating, registers from dripping and even prevents damage to wallpaper. Ceiling tiles last longer and food odors

infiltrating the dining area may be reduced.

- **Creature Comforts** — Low humidity provided by desiccant systems ensures that customers are not over-chilled when they come to the restaurant in humid weather. And the hard-working restaurant staff stays comfortable at low humidity, without the need to overcool the space and annoy paying customers.

- **Lower Operating Costs** — Increasing ventilation air usually means increased operating costs, but with economical gas-fired desiccant systems, power costs can remain the same, or in some cases can be reduced, while still providing enough fresh air to meet current ventilation codes.

- **Drafts Eliminated** — With increased ventilation air for the dining area, the old problem of drafty seating is reduced or eliminated. The fresh air is brought in though the desiccant, not by drafts through open doors, so customers stay comfortable regardless of seating location.

Now your foodservice establishment can experience the benefits of desiccant-based humidity control for far less than ever before, all while saving additional energy dollars which can add up to a wonderful enhancement to that ever important bottom line!

Going green with gas cooling and desiccant systems may just be the ticket to enhancing your customers' dining experience and keeping your employees productive and comfortable too, all while reducing the cost of expensive electric air conditioning.

To learn more about natural gas cooling and desiccant technology to help reduce your cooling cost and improve your bottom line, log on to the Gas Foodservice Equipment Network at www.gfen.info



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