

Lower Shore YMCA Gets Better Air Quality with Duct Redesign, Dehumidifier Replacement



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Overhaul to ductwork, dehumidifier results in IAQ improvements for YMCA
By Ralph Kittler, P.E.

After humidity-related corrosion caused overhead ductwork to fall in the Lower Shore YMCA, it was clear that the facility's aging and underperforming dehumidifier required immediate replacement.

Duct failure was just the latest in a string of humidity challenges the Y was experiencing. With a 10,000 sq-ft pool, there was plenty of call for dehumidification — but the system they had was not keeping up. Humidity levels were usually too high and swim teams were complaining of poor air quality. It was not uncommon for staff to prop open the outside doors to improve ventilation, says Jim Fodrie, Facilities Director for the YMCA of the Chesapeake, which runs the Lower Shore Y.

Along with the replacement unit, the Y took the opportunity to overhaul the facility interior. This included replacement of the roof, due to moisture damage, Fodrie says. Steve Purvis, Sales Engineer with Environmental Products, collaborated with the Y and their project engineer to size and select a new dehumidifier from Dectron and improve the airside design.

IMPROVED AIR DESIGN

When replacing their ductwork, the Y also took the opportunity to update its design to optimize the new dehumidifier's performance. Air distribution is critical to get right as, without an effective airflow pattern, air quality in a pool environment will always suffer.

There are different designs a facility can use for placement of supply, return and exhaust air openings that are viable. It ultimately depends on the



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needs of the space. In the Lower Shore YMCA, as Purvis advised, the supply air diffusers were placed high along the ceiling and the returns and exhaust were placed low. This is a typical design that is effective at turning over air in the room. The dehumidifier takes the return air and, after exhausting some to keep the space at negative pressure, dehumidifies it and blends in code-required fresh outdoor air to dilute harmful chemicals and supply it back into the space.

The new ducting is designed to work the supply air down into the breathing zone at deck level to ensure there are no areas of stagnation in the space. Doing so is critical to ensure patrons are comfortable and have high-quality air to breathe.

The dehumidifier selected was a Dry-O-Tron® LEEDeR® 162, designed to keep the space temperature at 88°F and within the ASHRAE recommended 50–60% RH. Relative humidity has a big impact on both people and objects, so keeping it within that range, in concert with an effective air distribution system, will ensure patrons are comfortable and there is no corrosion as a result of high humidity.

‘SOLID BUY’

Like many YMCA associations, the Y of Chesapeake is a small organization with a slim budget. That meant it was important to purchase a high-quality dehumidifier that will be affordable to operate and maintain, and will last for many years. The Dry-O-Tron® fit the bill, says Fodrie of the Y.

“It’s a very straightforward unit, it’s easy to do the preventative maintenance,” he says. “The Dectron machine is that really good, solid buy.”

In particular, Fodrie says he liked the simplicity of the unit’s inner workings. The dehumidifier has minimal piping on the inside and components are laid out in an uncomplicated way. The compressor, plus all major refrigeration

and electrical components, are kept separate from the airstream in a service vestibule. Besides protecting them from a potentially corrosive airstream, and keeping radiant heat from the compressor and blower motor out of supply air, the vestibule also allows many service tasks to be performed without interrupting the unit operation.

Dectron is a member of Dehumidified Air Services, North America's largest factory-direct dehumidifier service and support organization, and provides a factory technician on-site for every medium and large unit start-up. After assisting the installing contractor with start-up, the technician is available to provide complementary training to facility staff and service contractors on basic maintenance procedures.

Lower Shore's unit was installed outdoors and came with a packaged integral dry cooler for air conditioning. Because of the dry cooler design, refrigerant use is cut by over 80%. Refrigerant is kept sealed inside the unit and only water and glycol is used in the dehumidifier reheat coil or outside lineset, so compressor life is extended and there is much less chance of liquid refrigerant slugging/flooding. Because the dry coolers are filled with water/glycol and use a sealed and self-contained loop under slight pressure, facility staff do not need to open them seasonally to adjust a refrigerant charge.

A glycol runaround loop heat recovery system is mounted between the exhaust and outdoor airstreams, an option that allows the dehumidifier to transfer heat energy from the energy rich exhaust air into pre-heating incoming outdoor air. This option cuts the outdoor air heating costs by over 50%. It has a tremendous payback, even in a mild climate like the Lower Shore.

The compressor hot gas waste heat can also be recycled into providing free pool water heating, reducing the amount of energy needed to keep the pool water at operating temperature. A pool the size of the Lower Shore YMCA's loses on average 200,000 BTUs of heat per hour due to evaporation. When occupied, energy loss is even greater. As a result, payback is rapid when pool water heating mode is included with a dehumidifier. Plus, using the feature satisfies ASHRAE Energy Standard 90.1.

With improved air distribution and an energy-saving, easy-to-maintain new dehumidifier, Lower Shore YMCA has been provided a vastly improved dehumidification system. Fodrie says they plan to buy from Dectron again.

Ralph Kittler, P.E., is VP Sales National Accounts for Dehumidified Air Solutions (DAS) — a leading manufacturer of humidity and temperature control equipment. He's had more than three decades of experience in indoor pool design and dehumidification and is the revisor responsible for Chapters 25 (Mechanical Dehumidifiers) and Chapter 6 (Indoor Swimming Pools) in the ASHRAE Handbooks. He also was an ASHRAE Distinguished lecturer for 12 years on indoor pool design.



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