DXAIR INDOOR POOL DESIGN GUIDELINES

AIR DELIVERY (DUCT WORK) FOR INDOOR POOLS

Designing air flow delivery systems for pool dehumidifiers often times fall short of the required air turnover rates for indoor pools, and is often not sized properly, not installed properly to prevent condensation from areas that are prone to condensation when the outside temperature is colder than the indoor temperature. In many cases due to improper duct work the system may not maintain appropriate conditions of temperature and humidity once ductwork is installed and condensation will be found within the space.

A. *GREAT HEART - BAD ARTERIES*

DXAIR equates the air delivery or ductwork system in an indoor pool room to the arteries of your heart. You may have a great heart, but if the arteries are "plugged up" or are "choked down"…the heart is rendered useless. This applies to all indoor pool room air delivery systems as well. The dehumidifier is the heart – your air delivery system/ductwork are the arteries.The air delivery system is the most critical part of your dehumidification system installation.

Our approach to dehumidification and air flow is different from other manufacturers. We begin by designing a dehumidification system with 8 air turnovers/hour minimum on standard new construction. Additional air turnovers may be required upon review of building design and operating conditions. ASHRAE Guidelines provides 4-6 for residential and 6-8 for commercial projects (note that these are guidelines and often will change based on the structure/requirements). As residential pools in general have become larger than or as large as commercial projects and at varying temperatures, we take these factors in consideration. We will continue to exceed ASHRAE minimum requirements for air turnover rates to ensure a healthy, stable, and dry indoor pool room environment.

There are two options for installation in an indoor pool room: (1) Overhead ducting (blowing down) or (2) Underground (blowing up) in a continuous (peripheral loop). This basically means all the way around the pool room and back to mechanical space. This continuous loop of duct will have properly sized diffusers (registers), sized for the necessary airflow or CFM required to move air across glass or any other surface that can reach Dew Point Temperature and form condensation. Skylights need to be addressed in the design of the ductwork as well; as air flow is required across them or into them to prevent condensation.

Flex Duct and Fiberboard ductwork are NOT to be used in any air delivery system for the pool dehumidification unit. Galvanized metal or aluminum duct (stainless steel is not necessary) are the standards for the industry and provide the required air flow and statics necessary to meet the requirements for the pool room.

Square throats/transitions or any duct that is restrictive to air flow on either supply or return should not installed, as it affects the overall operation and performance of your system. All square throats must have turning vanes installed, and/or properly radiused duct according to the ACCA Manuals, SMACNA Manuals, ASHRAE Manuals etc. This does not mean that 8 square throats should be installed but as long as they have turning vanes this is acceptable. That is false. Limit the number of turns/transitions installed. The more "turns" and square throats in duct or duct not designed properly creates restrictions and air flow problems for these systems. Additional information is provided by DXAir for all installations.

Registers/Diffusers: In the natatorium all of the registers/diffusers should be designed (in most cases) as double deflection linear diffusers. They are installed to move air flow directly and across all glass or other surfaces prone to condensation. They are not installed blowing up, blowing down, in between windows, or across the pool. ALL DIFFUSERS MUST BE CLOSE ENOUGH TO THE GLASS AREAS TO BLANKET THEM WITH WARM AIR TO PREVENT CONDENSATION. Diffusers that are too far from the glass or other areas that are prone to condensation will not keep these areas dry and free of moisture.

They must be deflected at any surface prone to condensation and MUST be sized to accommodate larger window areas. This may be 6 to 12 inches from the glass areas depending upon the design of the duct work and static. Too small of a diffuser will not prevent condensation from forming on windows and door walls.
"As with any installation, proper duct design and installation is necessary for proper equipment performance. Poorly installed return duct connections, for example, can significantly reduce the performance of a dehumidifier. Turning vanes are mandatory in any ductwork with square throats and transitions. Fiberglass duct liner should not be used. Where condensation may occur, the insulation must be applied to the exterior of the duct. Duct materials and hardware must be resistant to chemical corrosion from the pool atmosphere. Fiberboard ductwork should not be used in a pool room environment. Grilles, registers and diffusers should be constructed from aluminum/non-corrosive.
Supply air should be directed against interior envelope surfaces prone to condensation (walls, glass, (skylights) & doors)."

Although recommended by other companies, DXAIR does not recommend blowing air across an open indoor pool. This causes an increase in evaporation rate of water, a chill affect on bathers and can increase evaporation rates and overall operating costs. Some companies recommend this approach to moving air across the pool water and putting return air duct at the deck level to minimize recirculation of chloramines. Return air is located closer to the floor area if your duct is overhead. If underground ducting is installed then the return air is installed at the highest point within the room. Installing the Return and Supply duct at the same level is problematic as the air flow is short circuited and does not condition the space properly. Return air must be greater than supply air. Return air installed at deck level to control the issue of chlorine/chloramines in indoor pools, does not work—that is a pool balancing issue, the problem is coming out of the water, the solution is treating the water properly — it is not a dehumidification or an air flow issue although mechanical is often required to "fix" the issue. Pulling highly chlorinated/salt water or imbalanced pool chemistry through your return air on the dehumidifier will cause deterioration to the system and components. Introducing more outside air to control chemicals/chlorines also does not work and may create a need to upsize the unit to accommodate (in warmer climates) or a need to provide additional heating in colder climates. If outside air is required, please follow the ASHRAE Manual guidelines for outside air.

DXAir duct design is a continuous loop at a .30 static on supply, and .07 on return air. We do not design the same statics as other companies because we are not using 8 row evaporator coils and larger blower motors to accommodate the coils.

With retrofit buildings, the ductwork must be reviewed and checked for any potential corrections prior to installing any new system.

Underground ducting is generally PCD and installed at a slight pitch back towards a floor drain. Overhead duct can be galvanized metal painted or aluminum. ASHRAE guidelines state that stainless steel ductwork should not be used within a natatorium.

IF THERE ARE ANY QUESTIONS REGARDING DUCT DESIGN, PLEASE CONTACT DXAIR IMMEDIATELY PRIOR TO ANY INSTALLATION OF OUR SYSTEMS. POORLY DESIGNED DUCT SYSTEMS AFFECT THE OVERALL OPERATION OF THE SYSTEM AND DO NOT PREVENT CONDENSATION AS REQUIRED WITHIN THESE STRUCTURES.