Increased Fresh Air in Schools

Creates Healthier Learning Environment

School districts around the nation need to increase classroom ventilation in order to provide healthful environments for working and learning.

Experts say adequate ventilation can solve the majority of indoor air quality (IAQ) problems that affect buildings such as schools.

Insufficient ventilation has been linked to increased indoor concentrations of volatile organic compounds and CO_2. Poor IAQ can lead to drowsiness, headaches and a lack of concentration, all of which are undesirable in a school. Allergies, asthma and colds may also worsen in bad IAQ situations. Studies show absenteeism is higher in schools with poor IAQ.

ASHRAE (the American Society of Heating, Refrigeration and Air-Conditioning Engineers) prescribes ventilation rates for acceptable IAQ. Moving large quantities of fresh air into schools and other buildings is essential for good IAQ, but in warmer, more humid regions, this can lead to unacceptably high indoor moisture levels.

"A typical HVAC system has no problem cooling both sensible (heat) and latent (moisture) loads, but when you get into scenarios like classrooms with high percentages of ventilation, HVAC can't perform the total cooling required," says Ed Berger, CEM, Project Engineer, Marketing, for UGI Utilities, Inc., of eastern Pennsylvania.

When incoming moisture gets out of control, it leads to condensation and damage in building materials, furnishings and even library books. In the worst cases, it can foster the growth of molds and other pathogens.

Indoor moisture problems can be found in many schools in the United States, from Georgia and Alabama to Minnesota. In northeastern Pennsylvania, three schools recently installed natural gas-regenerated Munters desiccant dehumidification systems that increased ventilation, stabilized indoor humidity levels and improved indoor air quality while yielding lower energy bills, decreased maintenance and, in one instance, significant savings from scaling down the cooling system during construction.

Good air quality can pay for itself: Enthalpy

Properly conditioning incoming fresh air can increase a school's total energy bill. But using an air-to-air energy-recovery device, such as an enthalpy wheel, can reduce both energy use and peak loads. An enthalpy wheel transfers heat and moisture from one air stream to another. During the summer, enthalpy wheels keep schools cool and dry by transferring sensible and latent energy from the ventilation air to the exhaust air, lowering both the temperature and relative humidity of the incoming air. They can cool incoming air to about 67°F wet bulb, reducing the amount of standard cooling required.

At Westwood Elementary School in the Elk River Area School District of Minnesota, energy recovery wheels helped the building become the state's first school to earn LEED certification. The school's energy recovery wheels transfer as much as 80% of the sensible and latent energy, greatly reducing energy costs.

Good air quality can pay for itself: Desiccant Dehumidification

John Fischer, Director of Research for SEMCO, Inc., in an ASHRAE paper on cost savings and cost avoidance for schools using desiccant-based systems, concluded that the payback period associated with their providing desirable IAQ can be very short.

A SEMCO Revolution® natural gas-fired hybrid cooling/dehumidification system supplies moisture-controlled fresh air at a Georgia school.

"Many of the benefits listed would be recognized year after year, whereas the cost associated with providing the desired IAQ is a one-time expense, if desiccant-based recovery is used to offset the added energy requirements," Fischer stated. Projected benefits – including lower absenteeism, fewer substitute teachers and reduced health care expenses – can quickly add up to cover initial installation costs.

Berger cites other reasons for increasing ventilation and controlling moisture: "It guarantees your RH, it mitigates the possibility of mold growth, and by transferring the electric load to gas you've reduced your peak cooling demand."

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