

# Improving Indoor Air Quality in Schools and Hospitals

## Upgrades to HVAC Ductwork Can Make a Big Difference

With the growing influence of the green movement over the past few years, the importance of having sustainable, energy-efficient buildings that provide a healthy environment for occupants has increased exponentially. Building owners and managers have shouldered the responsibility of researching and requesting these sustainable components for their own facilities.

One of the hot topics of discussion in the sustainable design arena today is indoor air quality, or IAQ, which refers to the content of interior air and how healthy it is for building occupants. IAQ problems arise in buildings whenever chemical or biological contaminants accumulate to levels that have a negative impact on the comfort or health of occupants. Buildings that reach these levels of contamination are often said to have Sick Building Syndrome (SBS), and there is plenty of potential for occupants to become sick as well.

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Poor IAQ can cause such health problems as headaches, nausea, fatigue, drowsiness, dizziness, respiratory diseases (bronchitis, Legionnaire's Disease, asthma, etc.), ear, nose, eye and throat irritation, and lack of concentration. These conditions are especially harmful in schools and healthcare facilities, where students and patients are more likely to be exposed to disease. Contaminated interior air in schools can lead to a decrease in student learning and productivity, as well as increased absenteeism when IAQ-related illnesses are spread. In healthcare facilities, such as hospitals and nursing homes, poor IAQ is a serious threat, as patients are either already suffering illnesses or have weak immune systems. Their health conditions are worsened by IAQ problems.

For these reasons, it is vital for facility managers of schools and healthcare facilities to understand the dangers of poor IAQ and ways to improve the quality of interior air in their buildings. In this article, we will take a closer look at one of the leading potential sources of poor IAQ in buildings — the HVAC system — and how fiber glass duct insulation can be used to help prevent IAQ problems.

### HVAC SYSTEMS: A LEADING SOURCE OF MOLD GROWTH

Responsible for distributing conditioned air from room to room and venting undesirable air, the HVAC system is sometimes referred to as "the lungs of a building." But, like real lungs, the ductwork of the HVAC system can become polluted if not properly cared for.

One of the leading causes of IAQ-related health problems is microbial growth in HVAC ductwork, which can spread to all rooms of a facility through the air distributed by the HVAC equipment. Many buildings, including schools and nursing homes, have been abandoned or demolished over the years because of the health threats they pose to occupants due to high presence of airborne molds and fungus spawned by overly damp conditions. These damp conditions often arise from condensation that forms on the inside and outside of HVAC ductwork as a result of changing temperatures from season to season.

#### FEATURED PRODUCTS

Fiber glass [duct liner](#), [duct wrap](#), [duct board](#) and [commercial board](#)

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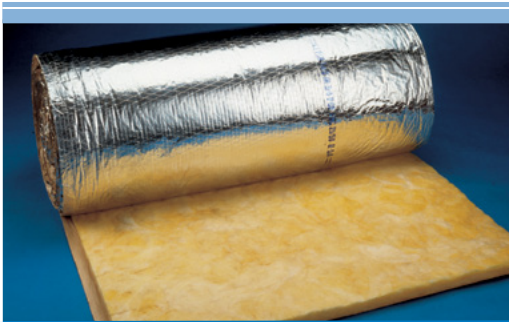
Good IAQ is particularly important in schools, where germs are more prevalent.

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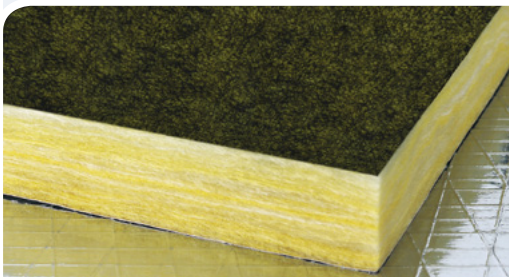




Standard duct wrap



ToughGard® duct liner



UltraDuct® Black duct board



Fiber glass commercial board

During summer, condensation often forms on warm, uninsulated sheet metal ducts when cool air passes through them, producing a sweat-like appearance on their surfaces. The same can happen in winter whenever warm air passes through cold ducts. Although this is a natural occurrence, it creates a breeding ground for harmful mold and microbes if dust or dirt is present and mixes with the moisture droplets. One of the ways to combat these moisture and mold problems is by installing fiber glass insulation on the interior and/or exterior of ductwork. Next, we'll cover the four main types of fiber glass duct insulation.

### FIBER GLASS DUCT INSULATION TYPES

#### Fiber Glass Duct Liner

Fiber glass duct liner is insulation installed on the interior of a rectangular sheet metal duct, designed to control heat loss or gain through duct walls, distribute air quietly and control condensation. Fiber glass duct liners will not support mold growth, are resistant to fiber erosion in accordance with industry standards and prevent the distribution of airborne mold or glass fibers. With mat-faced air stream surfaces, duct liners also resist damage during installation, maintenance and cleaning. They are manufactured in both roll and board form and are available in a variety of densities and thicknesses.

#### Fiber Glass Duct Wrap

Fiber glass duct wrap is an exterior duct insulation designed to fit snugly over rectangular, spiral, flat oval or irregularly shaped ductwork. It is a resilient fiber glass blanket that is factory-laminated to a vapor retarder facing, usually foil scrim kraft (FSK), and can be easily cut and fitted to achieve a neat, thermally effective installation. Like duct liner, duct wrap comes in various thicknesses and densities and is usually not installed in areas where ducts are exposed.

#### Fiber Glass Commercial Board

Available unfaced or with FSK or all service jacket (ASJ) facings, fiber glass commercial board insulation is installed on the exterior of round, rectangular, oval or irregularly shaped ducts, plenums, chillers and other HVAC equipment. Ranging from flexible to rigid, commercial board products are used to reduce heat loss or gain through duct, plenum or equipment walls.

#### Fiber Glass Duct Board

Fiber glass duct board is a 1-inch to 2-inch-thick rigid board made from resin-bonded inorganic glass fibers and is used to fabricate fiber glass ductwork. For commercial applications requiring thermal insulation, condensation control and acoustic control, fiber glass duct board provides an efficient, lower-cost alternative to sheet metal. The popularity of fiber glass ducts increased in the mid-1990s after the elimination of erosion problems that sometimes occurred during mechanical duct cleanings. This issue led manufacturers to develop a more durable, resistant duct board that weighs less than sheet metal, is easier to install and is resistant to corrosion. Often lower priced than sheet metal duct material, it is also an ideal choice for schools and other budget-conscious customers who need to economize without sacrificing quality.

Also, since insulation is integrated into the duct board, it provides the services of ductwork and duct insulation, all in one. The outside surface of the boards should feature a factory-applied reinforced aluminum air barrier and a vapor retarder, protecting the fiber glass ducts from air leakage and moisture accumulation.

When properly installed in conjunction with an efficient HVAC system, any of these four types of duct insulation can have a profound impact on improving IAQ. But even with fiber glass insulation, ductwork can still be a source of IAQ issues without one vital step—periodic duct maintenance.

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## DUCT MAINTENANCE IS KEY

Though duct insulation is capable of improving IAQ, thermal efficiency and acoustic performance once it's installed, it needs proper care. It is important to schedule periodic duct maintenance to keep the system clean and fully operational. Since preventive maintenance is very important in HVAC system design, many architects and HVAC engineers have begun to add this recommendation to their specifications.

A well-maintained HVAC system should include high-efficiency air filters of the correct size and quantity, and ducts should be regularly inspected for the detection and remediation of moisture and contaminants. If mold growth is present in uninsulated sheet metal ductwork during an inspection, the surface of the ductwork must be cleaned in compliance with the National Air Duct Cleaners Association (NADCA) ACR 2006 standard. If mold growth is present in fiber glass-lined ductwork, according to ACR 2006, the porous insulation material should be removed, followed by mechanical cleaning of the nonporous substrate. After the substrate has been cleaned, the insulation should be replaced.

The ACR 2006 standard requires that HVAC duct cleaning be performed with the system under negative pressure. This continuous negative pressure is accomplished through the use of a negative air machine. In addition, the standard requires the use of mechanical agitation methods, including:

- **Contact vacuuming**, which involves the conventional vacuum cleaning of interior duct surfaces. The hose of a high-powered vacuum cleaner with a high-efficiency particulate-air (HEPA) filter is inserted through holes cut into ductwork. Particles are drawn downstream through the duct and are removed from the system, preventing their release into the occupied space.
- **Air sweeping**, by which compressed air is introduced into a duct through a hose capped with a skipper nozzle, dislodging dirt, dust and debris. The dislodged particles become airborne and are drawn downstream through the duct and out of the system.
- **Power brushing**, by which a pneumatically or electrically powered rotation bristle brush is used to loosen dirt, dust and debris and draw it downstream and into a vacuum collector. When dealing with fiber glass ducts or sheet metal ducts lined with fiber glass insulation, HVAC cleaning professionals must take special care to use only brushes with soft, flexible polymer bristles that will remove debris without putting extra stress on surfaces.

## CONCLUSION

Installing an efficient HVAC system with ductwork that features high-quality fiber glass insulation and keeping a periodic duct-cleaning schedule are all excellent ways to build and maintain higher IAQ levels in schools and healthcare facilities. Taking these steps ensures a more comfortable and healthy interior environment for building occupants.



Installation of fiber glass duct board

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