

# CT Foundation for Environmentally Safe Schools

A nonprofit organization dedicated to promoting policies, practices and resources that protect school occupants from environmental health hazards

[www.pollutionfreeschools.org](http://www.pollutionfreeschools.org)

## 2012 School Ventilation Position Statement

### INTRODUCTION

The U.S. EPA has consistently ranked indoor air pollution among the top five environmental risks to public health. Indoor air can be five to 100 times more polluted than outdoor air.

School indoor air quality (IAQ) can be especially problematic because:

1. School buildings are one of the most densely occupied indoor spaces. Four times as many occupants per square foot are found in schools compared to office spaces.
2. Children who are the majority of school occupants are more vulnerable to the harmful effects of indoor pollutants by virtue of their size, behaviors, increased metabolic rates and developing organ systems.
3. Many normal, everyday school activities emit pollutants (e.g. ozone from copying machines and chemicals in art and science supplies).
4. Optimal ventilation systems have rarely been installed in schools due to pressures to reduce design and construction costs as well as a lack of awareness of the key role a ventilation system has in diluting and flushing out the concentration of indoor pollutants.

In 2003, PA 03-220: An Act Concerning Indoor Air Quality in Schools was passed by the Connecticut State Legislature by a nearly unanimous vote. Strong support for this law was generated by the conclusions of the Connecticut Academy of Science and Engineering (CASE) 2000 Report, Indoor Air Quality in Connecticut Schools, as well as three years of compelling testimony by children and adults whose health had been irrevocably harmed by poor indoor air quality (IAQ) in schools.

**According to the 2000 CASE report on school IAQ, “The most important direct cause of poor air quality is inadequate fresh air ventilation regardless of what other factors may contribute to this condition.”** Other factors contributing to indoor air pollution come from chemical sources (e.g. formaldehyde from new flooring or furniture or volatile organic compounds used in cleansers or paints) as well as biological sources (e.g. bacteria, fungi and molds found in water damaged walls, carpeting and ceilings). **The report also emphasized that poorly designed, operated and maintained HVAC systems (Heating, Ventilation and Air Conditioning Systems) accounted for the majority of indoor air quality problems in Connecticut’s schools.**

The importance of optimal ventilation rates in school settings cannot be overemphasized. Research has proven that inadequate air exchange affects the health, productivity and achievement of school children and employees. A major conclusion of a 2006 study conducted by the National Academy of Science was:

“The reduction of pollutants loads through increased ventilation and effective filtration has been shown to reduce the occurrence of building – associated symptoms (eye, nose and throat irritations; headaches; fatigue; difficulty breathing; itching and dry irritated skin) and to improve the health and comfort of building occupants.”

Elevated carbon dioxide levels indicate inadequate oxygen is being provided to school occupants by a building’s ventilation system. When carbon dioxide levels reach 1,000 parts per million (3 times more than what is normally found in the atmosphere), drowsiness, headache and an inability to concentrate ensue. Studies have shown high levels of carbon dioxide impair the ability to perform tasks involving concentration, calculation and memory. When ventilation problems were corrected in a 1996 European study involving 800 students in eight schools, test performance improved.

According to a recent Centers for Disease Control and Prevention (CDC) survey summarized in the October 2007 Journal of School Health, more than half (57.4%) of U.S. states require school districts or schools to conduct periodic inspections of HVAC systems. However, it is not known how many states have an oversight mechanism to verify compliance with this requirement.

It is critical to ensure that indoor air pollution is not being caused by and/or spread throughout the school building by a contaminated HVAC system. This essential point was expressly articulated in this recently published article when it stated: “Indoor air pollutants can originate within the building’s heating, ventilation and air conditioning (HVAC) equipment through microbiological growth in drip pans, duct work, coils, and humidifiers; improper venting of combustion products; and dust or debris in ductwork.”

## **PROBLEM**

More than eight years after PA03-220 was enacted, new cases of building related illnesses among school children and employees are still being reported in communities across Connecticut. Physicians have linked the onset of asthma and other lung diseases, allergies and sinus infections to environmental conditions in school facilities that have poorly designed, operated and maintained heating, ventilation and air conditioning systems.

Before the recent passage of PA 11-51, state reimbursement for school districts was reserved for code violations, roof replacement, new construction and extensive renovations or additions to existing buildings. The Commissioner of Construction Services has been directed by PA 11-51 to submit a plan for making the purchase and replacement of HVAC systems eligible for school construction grants if they reduce heating and fuel costs for a town or district. The narrow focus of this legislation is on energy efficiency, but could prevent and address some indoor air quality issues if these regulations are carefully and skillfully crafted.

Policy makers need to be aware that one of the most important conclusions of the 2006 report, Greening America’s Schools: Costs and Benefits is that savings from improved health benefits

outweighed conservation savings. When construction plans deliberately design healthy indoor environments into green school plans, the health benefit savings at \$63 per square foot far exceeded the energy and water savings at \$11 per square foot.

To accomplish the necessary balance between energy efficiency and healthy indoor air quality, it is critical that the Commissioner of Construction Services devise a plan that builds upon the 2009 Connecticut Building Standards Guidelines Compliance Manual for High Performance Buildings and the 2003 indoor air quality for schools law.

Sections 2, 6 and 7 of PA03-220: An Act Concerning Indoor Air Quality in Schools address HVAC system issues. Section 2 (CT General Statutes 10-220(d)) requires that facilities constructed, extended, renovated or replaced on or after January 1, 2003 conduct a uniform inspection and evaluation of heating, ventilation and air conditioning systems using a program such as the US EPA's Indoor Air Quality Tools for Schools Program. This inspection must take place prior to January 1, 2008 and every five years thereafter. The results of this inspection must be made available for public inspection at a regularly scheduled local or regional board of education meeting.

Unlike IAQ laws in California and Maine, Connecticut statutes do not require all schools to perform annual HVAC inspections. The 2000 CASE report on school IAQ specifically recommended that HVAC systems in CT schools be inspected annually. In order to adequately protect school children and employees from harmful indoor air pollution exposure, all Connecticut schools need to conduct a basic inspection of HVAC systems annually. This basic inspection does not need to be time consuming or costly and can detect or correct minor problems before school occupants are negatively affected. For example, such a basic inspection would ensure that all air intakes and exhausts are open, operating and unobstructed and that no intake is situated in a way that would bring contaminants into the building from other sources such as exhaust vents, standing water or idling vehicles. More comprehensive inspections that may involve balancing of HVAC air handling and ventilation systems need only occur every five years. Requirements for basic annual inspections in contrast to those conducted every five years need to be defined and tracked for compliance.

Section 6 of PA03-220 (CT General Statutes 10-291) states that the CT Department of Education shall not approve a school building project for new construction, extension, renovation or replacement unless plans include a plan to ensure that building maintenance staff are or will be trained in heating, ventilation and air conditioning systems with specific training relative to indoor air quality. School officials do not present a plan to the CT Department of Education. They are not asked in their application or the School Facilities Survey (ED050) to specify:

- A) What training was provided?
- B) When the training was presented?
- C) Who conducted the training?
- D) How mastery of skills was assessed?

The superintendent, architect and engineer sign an "Indoor Air Quality Certification" form to indicate that they are in compliance with these requirements. No further auditing or oversight is done before school districts receive state funding for new construction, extension, renovation or replacement of a school building.

Section 7 (CT General Statutes 10-231(e)) stipulates that effective July 1, 2003 each local and regional school board shall ensure that its HVAC (Heating, Ventilation and Air Conditioning) systems are maintained and operated at the prevailing maintenance standard at the time of its installation or renovation of such system.

The current prevailing standard was developed by the American Society of Heating, Ventilation and Air Conditioning Engineers (ASHRAE). It requires minimum rates of fresh outdoor air exchanges into buildings based on specific occupancy patterns. Section 7 also insists that:

- A) HVAC systems be operated continuously during the hours in which students and school personnel occupy school facilities.
- B) HVAC maintenance records be kept on file for at least for five years.

The CT SDE's School Facilities Survey (ED050) does not have questions that would track:

- A) How many CT schools meet ASHRAE ventilation standards
- B) Whether or not HVAC systems are operated as specified by PA03-220
- C) Whether or not HVAC maintenance records are kept for five years as is required by PA03-220

## **SOLUTION**

Establish regulations and/or pass legislation that will:

1. Establish minimum standards that school districts who upgrade or repair HVAC systems must meet to be funded by the state of Connecticut that build on existing statutes dealing with indoor air quality and ventilation
2. Require all CT schools to conduct annual HVAC inspections and post the results of these inspections on school and/or school district websites.
3. Revise the SDE School Facilities Survey (ED050) to include more specific questions dealing with existing statutes that require:
  - Operating HVAC systems continuously during the hours in which students and school personnel occupy school facilities
  - Keeping HVAC maintenance records for 5 years
  - Staff training on ventilation system for optimal energy efficiency and superior IAQ