

BUILDING VENTILATION IN EXISTING SCHOOLS

OVERVIEW OF STATE LAWS

Part of the ELI Series

[Topics in School
Environmental Health:
Overview of State Laws](#)

Environmental Law Institute

Why is this Issue Important for School Environmental Health?

Building ventilation is the introduction of outside air into a building, either naturally through windows and other openings or mechanically through heating, ventilation, and air conditioning (HVAC) systems or exhaust fans. Ventilation is important not only for comfort, but also for maintaining healthy indoor air quality by diluting and removing pollutants that are released indoors. There has been considerable research in recent years regarding the effect of ventilation on health and productivity. Reviews of studies focused primarily on offices and schools have found that increased ventilation rates are, on average, associated with fewer adverse health effects and with superior work and school performance. Recent research has found an association between higher indoor carbon dioxide levels and diminished decision making. However, studies have also shown that ventilation rates in many classrooms are below recommended guidelines. The U.S. EPA's 2013 report, *America's Children and the Environment*, notes that child care facilities and schools generally have a large number of occupants in a small space, so that "without proper ventilation a large number of children can be at risk for potential exposure to indoor contaminants."

For a summary of and citations to recent scientific research on ventilation and health/productivity from Lawrence Berkeley National Laboratory's Indoor Air Quality Scientific Findings Resource Bank, see: <https://iaqscience.lbl.gov/vent-summary>

For general background information on ventilation and IAQ in schools from the U.S. EPA, see: <https://www.epa.gov/iaq-schools/indoor-air-quality-tools-schools-action-kit-backgrounder-basics>

What Types of State Policies are Included in this Overview?

The chart below lists and describes a variety of state laws and regulations that establish ventilation requirements for *existing* school facilities.

Types of Laws Reviewed. This Overview is based primarily on a review of state *health* and *education* laws and regulations, which often include provisions governing existing school facilities. The Overview also includes selected state *occupational safety and health* regulations. Around half of all states have federally-approved regulations that apply to private and public workplaces (including schools); these regulations must be at least as strict as federal OSHA standards, and they may include requirements not found in the federal regulations. While federal OSHA standards address ventilation primarily in relation

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to industrial processes, the chart that follows includes a few examples of state OSHA regulations that include additional ventilation provisions that may be relevant to schools.

Certain types of laws that address ventilation in schools are *not* included here – most notably building codes that establish requirements governing the capabilities of ventilation systems at the time of construction or installation. These requirements often incorporate third-party technical standards, including minimum amounts of outside air, minimum efficiency ratings for particle filters, and design features of outdoor air intakes. Another type of state law not reviewed here are food service codes, which include ventilation provisions that may apply to existing school facilities.

Types of Policy Provisions Included. The topic of ventilation in existing school facilities is very broad. The chart that follows includes only state laws and regulations that address existing school facilities and that establish:

- Standards for ventilation (ranging from very general performance standards to specific numerical standards); or
- Requirements for operating ventilation systems or for carrying out specific maintenance practices.

This Overview is intended to be illustrative, rather than exhaustive. There may be other state policies that relate to ventilation standards, operation, and maintenance that are not included here. Moreover, the Overview does not summarize general provisions for school facility maintenance plans or for school facility inspections, though such requirements can be important for preventing and addressing ventilation problems at schools. A separate [Topic Overview](#) describes state policies that require or promote school IAQ management plans, which also may be useful in ensuring effective operation of ventilation systems.

States included in the summary chart below: AK, AZ, AR, CA, CO, CT, DE, FL, HI, IL, IN, KY, LA, ME, MN, MO, NH, NJ, NM, NY, NC, PA, TX, UT, WA, WV

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STATE & CITATION	BUILDING VENTILATION IN EXISTING SCHOOLS SUMMARY OF LAW/REGULATION
<p>ALASKA 18 Ak. Admin. Code §§ 30.360, 370, 970</p>	<p>Alaska’s environmental <i>sanitation</i> regulations require schools and certain other regulated facilities to provide ventilation by natural or mechanical means to “keep air fresh and to prevent the accumulation of excessive heat, steam, condensation, vapors, smoke, and fumes.” The regulations also require that school showers, drying areas, locker rooms, and clothing storage areas be ventilated by mechanical exhaust systems. In addition, ventilation must be provided if vocational or laboratory programs may create vapors, fumes, or other hazards.</p>
<p>ARIZONA Az. Stat. § 15-2011; Az. Admin. Code § R7-6-215</p> <p>Az. Stat. § 15-2132</p>	<p>Arizona <i>education</i> law requires the School Facilities Board to adopt rules establishing minimum school facility adequacy guidelines. The Board’s regulations incorporate classroom air standards that address ventilation, including a requirement that each general, science, and art classroom have an HVAC system capable of maintaining a CO₂ level of not more than 800 PPM above the ambient CO₂ level. A random sample of 10% of these classrooms in each building must be measured to determine the classroom air quality level for the school facility, using a work surface in the approximate center of the classroom, under normal conditions.</p> <p>Arizona <i>education</i> law also requires schools to maintain and operate their HVAC systems in accordance with standards in effect at the time the system was installed or renovated. Schools with HVAC systems installed or renovated since April 2005 must ensure that the HVAC system is operated continuously during school hours, with stated exceptions</p>
<p>ARKANSAS Ar. Code §§ 6-21-804, 808, 813; Code Ar. Rules § 203.00.14-3.21</p>	<p>Arkansas <i>education</i> law requires the state to develop a Public School Facilities Custodial, Maintenance, Repair, and Renovation Manual with uniform standards for public school facilities. The Manual, incorporated into state education regulations, establishes a section titled “Process and Procedures for Inspection, Cleaning, Servicing and Repair of Heating, Ventilation and Air-Conditioning Systems.” Required maintenance practices include cleaning/replacement of filters, annual system inspections, and other specific servicing practices. The law also requires the state to ensure that all lawfully required inspections of academic facilities – including scheduled, unscheduled, or emergency inspections of HVAC and IAQ systems – are performed, and that any violation is remedied within 30 days of the inspection or as soon as reasonably possible thereafter.</p>
<p>CALIFORNIA Ca. Educ. Code § 17070.75</p> <p>Ca. Labor Code §142.3;</p>	<p>California <i>education</i> law requires school districts to establish, as a condition of receiving state school facility funds, a facilities inspection system to ensure that schools are maintained in “good repair.” The law requires the State Allocation Board to establish a school facility inspection and evaluation instrument that defines “good repair” and includes, among other criteria, the requirement that mechanical ventilation systems be “functional and unobstructed” and “[a]ppear to supply adequate amount of air to all classrooms, work spaces, and facilities.” These criteria are included in the Board’s Facility Inspection Tool (FIT), which is to be used as a visual inspection tool by schools and county offices of education to complete the mandatory State Accountability Report Card and to exercise oversight of schools that are ranked in deciles 1-3 of the state’s Academic Performance Index.</p> <p>California <i>occupational safety and health</i> law authorizes the state Occupational Safety and Health</p>

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<p>8 Ca. Code Regs. §§ 5142-5143</p>	<p>Standards Board to adopt occupational safety and health standards that are at least as effective as federal standards and provides for state workplace inspections. Regulations implementing the law apply to schools and other public workplaces and establish, among other things, minimum standards for mechanically-driven HVAC systems to provide minimum building ventilation. HVAC systems must be maintained and operated to provide at least the quantity of outdoor air required by the State Building Standards Code in effect at the time the building permit was issued, and HVAC systems must be operated continuously during working hours, with stated exceptions. HVAC systems must be inspected at least annually, and problems found must be corrected within a reasonable time. Inspections and maintenance activities must be documented in writing.</p> <p>The occupational safety and health regulations also set out detailed requirements for design, maintenance, and operation of mechanical exhaust systems to “prevent harmful exposure by maintaining a volume and velocity of exhaust air sufficient to gather dusts, fumes, mists, vapors or gases ... thereby preventing their dispersion in harmful quantities into the atmosphere of work rooms or other places where persons are employed.” In addition to standards for disposal of exhaust materials, the requirements include standards for supply of makeup air that is clean, fresh, and free of contamination, including regular replacement or cleaning of filters to prevent significant reductions in airflow. The ventilation rate of every mechanical ventilation system used to prevent harmful exposure must be tested after maintenance and at least annually.</p>
<p>COLORADO Co. Rev. Stat. § 25-1.5-101; 6 Co. Code Regs. §§ 1010-6:6.9.3, 1010-6:6.12.4</p>	<p>Colorado public <i>health</i> law assigns the Department of Public Health and Environment the power and duty to establish and enforce sanitary standards for the operation and maintenance of schools. The Department’s regulations governing schools require that mechanical or natural ventilation be installed and maintained in accordance with ASHRAE standards 62.1-2013 and in order to “minimize health hazards including excessive drafts, extreme temperatures, humidity, and temperature fluctuations.” Filters must be cleaned or replaced regularly or according to the manufacturer’s recommendations in order to prevent excessive accumulation of dust or debris. The regulations specify that rooms with exhaust systems must have air supplied equal to the amount exhausted, and windows may not be used for providing makeup air. Laboratories and other specialty classrooms must be “adequately ventilated through mechanical means so that exposures to hazardous or toxic materials are maintained to a safe level,” and must have local exhaust ventilation to ensure that “contaminants are exhausted away from the student and not through the breathing zone,” with air flow tested and documented annually.</p>
<p>CONNECTICUT Ct. Gen. Stat. § 10-231e</p>	<p>According to Connecticut <i>education</i> law, every local or regional board of education must ensure that its HVAC system is “maintained and operated in accordance with the prevailing maintenance standards, such as ASHRAE Standard 62” at the time of the system’s installation or renovation. The system must be operated continuously during the hours in which a school facility is occupied, with stated exceptions. The board must keep records of the maintenance of ventilation systems for at least five years.</p>
<p>DELAWARE 14 Del. Code § 1055 14 Del. Admin. Code § 885</p>	<p>The Delaware <i>education</i> code requires the school board of each reorganized school district to provide for “proper ventilation” of buildings.</p> <p>State <i>education</i> regulations also include rules for Safe Management and Disposal of Chemicals in the Delaware Public School System, which set forth the criteria and processes for use and storage of chemicals in classrooms, laboratories, or other instructional areas in schools. These rules require use of a properly functioning fume hood and/or other industry-standard ventilation system when mixing, using, or storing chemicals. The rules also require that fume hoods and other ventilation systems comply with the state’s <i>Safety First: Safe Instructional Practices in the Classroom and Laboratory</i> manual. The manual includes a variety of ventilation practices for school labs, including: ensuring that “[a]dequate ventilation appropriate for the laboratory exercise” be maintained; ensuring minimum air exchange rates for lab areas; prohibiting recycling of the air supply to other parts of a building; only conducting experiments that the ventilation system can handle; and putting in place preventive maintenance programs requiring filter changes about four times per year.</p>

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<p>FLORIDA Fl. Stat. § 1013.20; Fl. Admin. Code r. § 6A-2.0010</p> <p>Fl. Stat. § 381.006; Fl. Admin. Code r. § 6A-2.0040</p>	<p>Florida <i>education</i> law requires the State Board of Education to adopt and administer rules prescribing standards for the safety and health of occupants of educational facilities through the State Requirements for Educational Facilities (SREF). Pursuant to the rules, school board policies must establish, among other things, that HVAC filters be kept “clean, serviceable and orderly at all times, and ...sized to prevent unfiltered air from entering the airstream.” Requirements specific to relocatable classrooms include: adequate humidity control and provision of fresh air; clean filters, coils, and condensate lines; properly operating dampers; outdoor intakes that are free of pollutant sources; and no signs of mold or mildew in or around the HVAC system. Boards of education must conduct at least one inspection of each building annually, and HVAC systems must be inspected “to ensure the system is operating as designed and must be re-evaluated if space use changes occur or if unusual contaminants or unusually strong sources of specific contaminants were introduced into the space after the most recent inspection.”</p> <p>State <i>health</i> law gives the Department of Health, jointly with the Department of Education, authority to address sanitation in private schools. State <i>education</i> regulations establish sanitation standards for K-12 private schools, which require that all occupied rooms and other rooms where odors or contaminants are generated be vented to the outside and that ventilation rates be maintained as designed. The regulations establish requirements for natural ventilation; where these requirements are not met, mechanical ventilation systems must be maintained to ensure air movement throughout the room at the level of the seated student, and fans and blowers must be maintained to provide the required air movement without excessive or disturbing noise. Mechanical ventilation systems must be maintained in laboratories, art rooms, and other areas of high air contamination.</p>
<p>HAWAII Hi. Admin. Code § 11-11-9</p>	<p>Under Hawaii’s <i>health</i> regulations, every school bathroom must be “properly ventilated” by means of a window opening directly to the external atmosphere or an “approved system of mechanical ventilation.”</p>
<p>ILLINOIS 105 Il. Comp. Stat § 5/34-205</p>	<p>Illinois <i>education</i> law requires that cities of over 500,000 inhabitants have proposed “minimum and optimal” school facility performance standards addressing IAQ, thermal comfort, environmental hazards, and other parameters. Chicago Public Schools Facility Performance Standards (2012) establish minimum and optimal ventilation criteria, including requirements for quantity of outdoor air and filtration of air.</p>
<p>INDIANA In. Code §§ 16-41-37.5-1—4; 410 In. Admin. Code §§ 33-4-1 et seq.;</p> <p>410 In. Admin. Code §§ 6-5.1-1 et seq.</p>	<p>Indiana’s <i>health</i> code requires the state Department of Health to adopt rules establishing a school IAQ inspection, evaluation, and parent/employee notification program. The code also requires the Department to develop and revise every three years a manual of best practices for managing IAQ in schools and to provide the manual to state education and school district officials. The code establishes additional duties of the Department, which include: inspecting a school if the Department receives an IAQ complaint; reporting findings and identifying any conditions that are contributing or could contribute to poor IAQ, including carbon dioxide levels; and providing guidance on steps the school should take to address any problems.</p> <p>The Department of Health has adopted rules to implement the law, which incorporate IAQ criteria that schools must meet and that will be reviewed during state inspections. Pursuant to the rules, outdoor air must be supplied to classrooms when occupied, and carbon dioxide concentrations in the “breathing zone” must never exceed 700 ppm over the outdoor concentration. All specialty rooms must meet the default values for minimum ventilation rates in breathing zones as published in the ANSI/ASHRAE Standard 62.1-2007. Where provided, air conditioning must be operated to maintain 65% relative humidity during occupancy. In addition, schools are required to establish and maintain written procedures for routine HVAC maintenance, including: inspecting and cleaning HVAC coils at least annually; inspecting/changing filters according to schedule; and ensuring</p>

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	<p>ventilation pathways are clear and performing as required. The written procedures must be available for review by the state inspector, and schools also must maintain written maintenance logs covering cleaning and filter changes for a minimum of three years.</p> <p>The Department also has established sanitary engineering rules that include health and safety requirements for school buildings. According to these rules, school buildings must be provided with natural ventilation or a mechanical ventilation system that supplies “a minimum of five (5) cubic feet per minute of outside air, with a total circulation of not less than fifteen (15) cubic feet per minute per occupant in all portions of the building.” Each ventilation system must be operated continuously whenever a room it serves is occupied, and ventilation “shall be sufficient to provide adequate oxygen and a character of freshness in the air and to remove exhaled air and undesirable odors during periods of student occupancy.” Certain areas where toxic or otherwise objectionable odors are produced (e.g., gymnasiums, laboratories) must be mechanically exhausted to the outside.</p>
<p>KENTUCKY Ky. Stat. 156.160; 704 Ky. Admin. Regs. § 4:020</p>	<p>Kentucky’s <i>education</i> law requires the state Board of Education to promulgate regulations governing school buildings and classrooms. State education regulations require each local board of education to “provide and maintain a physical environment that is conducive to the health and safety of school children” and to “establish and maintain... adequate...ventilation in all school buildings” and adequate control of air pollutants.</p>
<p>LOUISIANA La. Admin Code. tit. 51, pt. XVII, § 103</p>	<p>Pursuant to Louisiana <i>health</i> regulations, every public and government building in the state, including every school, must be “adequately” ventilated.</p>
<p>MAINE 20-A Me. Rev. Stat. § 6302; 05-071 Code of Maine Rules Ch. 125, § 11</p>	<p>Maine <i>education</i> law requires school administrative units to ensure that the HVAC system is maintained and operated to provide at least the quantity of outdoor air required by the state building standards code in effect at the time the system was installed, and to operate the system continuously during school activity hours, with stated exceptions. State education regulations further provide that each room used for instructional purposes must have “sufficient air changes to produce healthful conditions and to avoid odors or concentrations of toxic substances or dust particles.” Pursuant to the education law, school units are responsible for ensuring that their HVAC systems are inspected at least annually and that any problems are corrected within a reasonable time, and they must maintain written records of HVAC inspection and maintenance for at least five years.</p>
<p>MINNESOTA Mn. Admin. Code § 5205.0110</p>	<p>Minnesota <i>occupational safety and health</i> regulations establish indoor ventilation requirements for places of employment, including schools. The regulations establish that: “Outdoor air shall be provided to all indoor places of employment at the rate of 15 cubic feet per minute per person.”</p>
<p>MISSOURI Mo. Rev. Stat. § 177.031</p>	<p>Missouri <i>education</i> law directs school boards to keep school buildings in good repair and to provide the material and appliances necessary for “proper” ventilation and sanitation of the facilities.</p>
<p>NEW HAMPSHIRE N.H. Rev. Stat. § 200:11-a; N.H. Code Admin. R. Ed § 306.07</p>	<p>New Hampshire <i>education</i> law requires school principals to conduct an annual IAQ investigation of all school buildings using a checklist provided by the state Department of Education and to file the completed checklist with the Department, the local school board, and local health officials. The law requires the Department to adopt regulations establishing the checklist, which must enable evaluation of the physical conditions that can affect IAQ, including ventilation. The checklist established by the Department incorporates a variety of best practices addressing HVAC maintenance, including changing filters, draining condensate pans, cleaning HVAC components, and ensuring equipment is unobstructed. The law also requires the Department to ensure that every</p>

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<p>N.H. Code Admin. R. Ed § 321.18</p>	<p>public school in the state has a copy of the U.S. EPA’s <i>IAQ Tools for Schools</i> resource and to encourage schools to implement the program.</p> <p>Separate state <i>education</i> regulations require schools to be constructed and “maintained to provide...[c]ode compliant outside air ventilation and exhaust systems to aid in the maintenance of indoor air quality.”</p>
<p>NEW JERSEY N.J. Stat. § 34:6A-1; N.J. Admin Code §§ 12:100-13.1 et seq.</p>	<p>New Jersey <i>occupational safety and health</i> law requires every employer to furnish a place of employment that is reasonably safe and healthful for employees. Rules adopted under the law and administered by the Department of Health establish provisions for addressing IAQ in schools and other public workplaces, including requiring employers to establish and implement a preventive HVAC maintenance schedule that must include a number of specific maintenance practices, such as checking/changing filters and belts. Pursuant to the rules, when indoor carbon dioxide levels exceed 1,000 ppm, the employer must check to make sure the HVAC system is operating as it should and take any necessary steps. Where housekeeping and maintenance activities could reasonably be expected to result in hazardous chemical or particulate exposures to employees, employers must use exhaust ventilation. If contamination of the make-up air supply is identified and documented, inlets and/or outlets must be relocated or the source of contamination eliminated. Employers also must undertake certain prevention and clean-up practices for microbial contamination in ductwork or other HVAC system components. The employer must maintain and update annually a written compliance plan describing how it will achieve compliance with the requirements, as well as keep and make available a record of maintenance activities.</p>
<p>NEW MEXICO N.M. Admin. Code §§ 6.27.30.1, et al.</p> <p>N.M. Admin. Code § 6.29.1</p>	<p>New Mexico <i>education</i> regulations issued by the Public School Capital Outlay Council set forth statewide adequacy standards, which establish the acceptable levels for the physical condition of school buildings and are intended for use in the evaluation of existing public school facilities. The standards address classroom air quality, among other school health and safety issues, and include a requirement that classrooms have an HVAC system that “continually moves air and is capable of maintaining a CO₂ level of not more than 1,200 parts per million.” The rules require air quality to be measured at a work surface in the approximate center of the classroom.</p> <p>State <i>education</i> regulations also require school districts and public charter schools to establish and review annually written school safety procedures that ensure “adequate ventilation” in school laboratories and shops.</p>
<p>NEW YORK 8 N.Y. Code Rules & Regs. § 155.7</p>	<p>New York <i>education</i> regulations governing health and safety in existing educational facilities require that “ventilation with fresh air” be available in all occupied spaces.</p>
<p>NORTH CAROLINA 15A N.C. Admin. Code § 18A.2412</p>	<p>North Carolina public <i>health</i> law requires the state health agency to adopt school sanitation rules that address ventilation, among other things, and to inspect schools at least annually for compliance with the rules. The state’s environmental health rules for school sanitation require that ventilation be provided as required by the state building code, and that all windows and fixtures (e.g., grills, vents) be kept clean and in good repair.</p>
<p>PENNSYLVANIA 24 Pa. Code § 7-737</p> <p>25 Pa. Code § 171.14</p>	<p>Pennsylvania’s <i>education</i> code prohibits public schools from using any schoolroom that is not provided with “ample means of ventilation.”</p> <p>Pennsylvania’s environmental <i>health</i> regulations for schools include a requirement that “[i]n all rooms of the school, when mechanical ventilation is not provided, means shall be provided to insure adequate, natural ventilation.”</p>

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<p>TEXAS Tx. Health & Safety Code § 341.065</p>	<p>Texas health law governing sanitation of school buildings and grounds establishes that school buildings must be “properly ventilated.”</p>
<p>UTAH Utah Admin. Code R392-200</p>	<p>Utah <i>health</i> regulations establish minimum standards for the design, construction, operation, sanitation, and safety of schools. The standards require that ventilation be provided throughout the school in accordance with Utah’s mechanical code, and that air ducts “be maintained to prevent the entrance of dust, dirt, and other contaminating materials.”</p>
<p>WASHINGTON Wa. Rev. Code § 28A.335.010 Wa. Rev. Code § 43.20.050; Wa. Admin. Code § 246-366-080</p>	<p>Washington’s <i>education</i> code requires school boards to ensure that all school buildings are “properly heated, lighted, and ventilated.”</p> <p>Washington <i>health</i> law requires the state Board of Health to adopt rules addressing environmental conditions in public facilities, including schools. State Department of Health regulations establish minimum environmental health and safety standards for primary and secondary schools, including the requirement that rooms used by students or staff must “be kept reasonably free of all objectionable odor, excessive heat or condensation,” and that “[a]ll sources producing air contaminants of public health importance shall be controlled by the provision and maintenance of local mechanical exhaust ventilation systems as approved by the health officer.” The regulations also require that the state health and education agencies “prepare a guide for use by department personnel during routine school inspections” that includes recommendations for facility safety practices. The guide established by the agencies includes both required and recommended ventilation maintenance practices.</p> <p>In 2009 the agency adopted revisions to the school health and safety rule (Wa Admin Code, ch. 246-366A), including best practices for operation and maintenance of ventilation systems in existing school facilities. However, the legislature has suspended implementation of the revised rules, and the existing rules remain in effect.</p>
<p>WEST VIRGINIA W. Va. Code St. Rules § 64-18-9</p>	<p>West Virginia <i>health</i> regulations establish minimum public health and sanitation requirements for all institutions and schools. Under the rules, every indoor space intended for human occupancy must be ventilated by natural or mechanical means; a minimum of 5 cfm per person of outdoor air must be provided, and all rooms are required to have sufficient ventilation to keep them free of excessive heat, steam, condensation, vapors, obnoxious odors, smoke and fumes. Intake and exhaust ducts must be maintained to prevent entrance of dust, dirt, and other contaminating materials, and the rules specify that HVAC systems must be in compliance with the requirements of the State Building Code.</p>

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