

Date of Hearing: April 6, 2022

ASSEMBLY COMMITTEE ON EDUCATION  
Patrick O'Donnell, Chair  
AB 2232 (McCarty) – As Introduced February 15, 2022

**[Note: This bill is double referred to the Assembly Higher Education Committee and will be heard by that Committee as it relates to issues under its jurisdiction.]**

**SUBJECT:** School facilities: heating, ventilation, and air conditioning systems

**SUMMARY:** Requires a school district, county office of education (COE), charter school, private school, the California Community Colleges (CCC), the California State University (CSU), and the University of California (UC) if the UC Board of Regents chooses, once every five years, to inspect heating, ventilation, and air conditioning (HVAC) systems based on specified requirements, and ensure that all classrooms are equipped with a carbon dioxide monitor. Specifically, **this bill**:

- 1) Establishes the following definitions:
  - a) “Certified TAB Technician” means a technician certified to perform testing, adjusting, and balancing of HVAC systems by the Associated Air Balance Council, the National Environmental Balancing Bureau, or the Testing, Adjusting and Balancing Bureau;
  - b) “Covered school” means a school district, a COE, a charter school, a private school, the CCCs, or the CSU;
  - c) “HVAC” means heating, ventilation, and air conditioning;
  - d) “HVAC Acceptance Test Technician” means a technician certified to complete the forms set forth in subparagraph (B) of paragraph (1) of subdivision (b) of Section 10-103.2 of Part 1 of Title 24 of the California Code of Regulations by an Acceptance Test Technician Certification Provider approved by the State Energy Resources Conservation and Development Commission (CA Energy Commission) to provide that certification;
  - e) “Ppm” means parts per million; and
  - f) “TAB” means testing, adjusting, and balancing.
- 2) Requires a covered school to, and the UC is requested to, ensure that facilities, including, but not limited to, classrooms for students, have HVAC systems that meet the minimum ventilation rate requirements set forth in Table 120.1-A of Part 6 (commencing with Section 100.0) of Title 24 of the California Code of Regulations, to prevent students from being exposed to poor indoor air quality conditions.
- 3) Requires, at least once every five years, the annual inspection required for HVAC systems pursuant to Section 5142 of Title 8 of the California Code of Regulations of a covered school to include, and for the UC is requested to include, all of the following:
  - a) Verification that HVAC system filters are installed correctly and replaced where needed;

- b) Calculation of the required minimum outside air ventilation rates for each classroom based on the anticipated classroom size and the minimum required ventilation rate per occupant set forth in Table 120.1-A of Part 6 (commencing with Section 100.0) of Title 24 of the California Code of Regulations, and, where needed, adjustment of the classroom ventilation rates to meet those standards.
  - c) Requires testing to be performed by a Certified TAB Technician or a HVAC Acceptance Test Technician and adjustments to be performed by a Certified TAB Technician;
  - d) Where applicable to the HVAC system inspected, performance of the testing requirements of the Mechanical Acceptance Tests adopted by the State Energy Resources Conservation and Development Commission for (i) Outdoor Air Acceptance; (ii) Constant Volume, Single-Zone, Unitary Air Conditioner and Heat Pump Systems Acceptance; (iii) Air Economizer Controls Acceptance; and (iv) Demand Control Ventilation Systems Acceptance. Requires the Mechanical Acceptance Tests to be performed by a HVAC Acceptance Test Technician;
  - e) Review of control sequences to verify systems will maintain intended ventilation, temperature, and humidity conditions during school operation;
  - f) Testing and recalibration of carbon dioxide sensors, except for carbon dioxide sensors installed or recalibrated within the previous three years; and
  - g) Recommendations for repairs, replacements, or other remediation necessary to correct issues identified by the inspection and documentation of any repairs, adjustments, replacements, or other remedial actions taken to correct these issues.
- 4) Requires the documentation of compliance with the annual inspection required by this bill, including documentation of any repairs, adjustments, replacements, or other remedial actions taken or recommended to correct issues identified by the inspection, to be maintained by a covered school, and is requested to be maintained by the UC, for at least two compliance cycles, or 10 years, and made available to the public upon request.
- 5) Requires a covered school to, and the UC is requested to, ensure that all classrooms are equipped with a carbon dioxide monitor that meets all of the following requirements:
- a) Carbon dioxide monitors installed in existing classrooms are hardwired or plugged in and mounted on the wall between three and six feet above the floor and at least five feet away from the door and operable windows;
  - b) Carbon dioxide monitors for all new classroom construction are hardwired and, where applicable, integrated with building automation systems to ensure proper control of the outdoor air damper and demand control ventilation features;
  - c) The carbon dioxide monitor displays the carbon dioxide readings through a display on the device or other means, such as a web-based application or cellular phone application;
  - d) The carbon dioxide monitor provides a notification through a visual indicator on the monitor, such as an indicator light, or other alert system, such as an electronic mail, text,

or other cellular phone application, when the carbon dioxide levels in the classroom have exceeded 1,100 ppm;

- e) The carbon dioxide monitor maintains a record of previous data that includes at least the maximum carbon dioxide concentration measured;
  - f) The carbon dioxide monitor has a range of 400 to 2,000 ppm or greater; and
  - g) The carbon dioxide monitor is certified by the manufacturer to be accurate within 75 ppm at 1,000 ppm carbon dioxide concentration and to require calibration no more frequently than once every five years.
- 6) Provides that the requirements in (5) may be amended by the Division of the State Architect (DSA) by regulation as necessary to reflect available technology and to achieve the intent of this bill.
- 7) Requires the classroom ventilation rates, or for the UC is requested to, be adjusted by a Certified TAB Technician to ensure that peak carbon dioxide concentrations in the classroom remain below the maximum allowable carbon dioxide ppm setpoint if a classroom carbon dioxide monitor of a covered school or the UC indicates carbon dioxide concentrations greater than 1,100 ppm more than once a week, as recorded by the monitor or as observed by a teacher or other staff.
- 8) Requires a covered school to, and the UC is requested to, keep a complete and accurate record for each incident where the carbon dioxide setpoint was exceeded in a classroom and a record of any remediation or adjustments made as a result of the exceedance, maintain these records for at least five years, and make these records available to the public upon request.
- 9) Specifies that this bill shall apply to the UC only to the extent that the Regents of the UC, by resolution, make it applicable.
- 10) Finds and declares that it is the policy of this state that school facilities be designed and operated using available measures to provide a healthy indoor environment for students, teachers, and other occupants including, but not limited to, healthy indoor air quality and adequate ventilation with outdoor air; that the persistence of underperforming HVAC systems and inadequate ventilation rates in the classroom highlight the need for more prescriptive testing, monitoring, and maintenance requirements; and that monitoring levels of carbon dioxide in classrooms will help ensure that California students' school environment is healthy and conducive to learning and performing well on tests.

#### **EXISTING LAW:**

- 1) Defines "good repair" as a facility that is maintained in a manner that assures that it is clean, safe, and functional. Requires the school facility inspection and evaluation instrument and local evaluation instruments to include specified criteria, including the criterion that mechanical systems, including HVAC systems, are functional and unobstructed and appear to supply adequate amount of air to all classrooms, work spaces, and facilities. (Education Code (EC) 17002)

- 2) Requires the State Allocation Board (SAB) to require school districts to make all necessary repairs, renewals and replacements to ensure that a project funded by state bond funds is at all times maintained in good repair, working order and condition. Requires a school district to establish a restricted account within the school district general fund for the purpose of providing moneys for ongoing and major maintenance of school buildings. (EC 17070.75)
- 3) Requires the local control and accountability plan (LCAP) to include actions that address eight state priorities, including ensuring that school facilities are maintained in good repair. (EC 52060)
- 4) Authorizes the Occupational Safety and Health Standards Board to adopt, amend or repeal occupational safety and health standards and orders. (Labor Code 142.3)

**FISCAL EFFECT:** This bill has been keyed a possible state-mandated local program by the Office of the Legislative Counsel.

**COMMENTS:**

**Need for the bill.** The author states, "Poor air quality in classrooms is a pervasive problem that negatively impacts student health and learning. Despite laws requiring schools to maintain functional HVAC systems to supply adequate ventilation and safe indoor air quality, poor indoor air quality remains an extensive problem. Additionally, poor installment of HVAC systems substantially increase energy costs and fail to maintain good indoor air quality. AB 2232 will require comprehensive HVAC inspections and air monitors in classrooms to ensure the wellbeing and learning of California students are protected from the harmful effects of poor air quality."

**HVAC requirements.** Various sections of the law, in different Codes and Code sections, require school facilities to be in good working order and well maintained, including specified inspections. In 2004, the state settled the *Williams v. California* lawsuit and agreed to a number of initiatives intended to provide equal access to instructional materials, safe and decent school facilities, and qualified teachers. The settlement resulted in an agreement to provide funds to low performing schools (deciles 1-3 on the Academic Performance Index), including \$800 million for emergency repair of school facilities. COEs were charged with inspection of the low-performing schools based on criteria of schools in good repair. "Good repair" is defined as a facility that is clean, safe and functional. The settlement also includes a lengthy list of facilities components required to be inspected, including gas pipes, doors and windows, fences, fire sprinklers, fire extinguishers, alarm systems, electrical systems, lighting, drinking fountains, roofs, gutters, and mechanical systems, which includes HVAC systems.

Under the Labor Code, the Occupational Safety and Health Standards Board (Board) is authorized to develop health and safety requirements for the protection of workers. Regulations adopted by the Board (Title 8, Section 5142) require HVAC systems to be maintained and operated in accordance with the State Building Standards Code and continuously functioning during working hours with some exceptions (e.g., during scheduled maintenance). The regulations also require the HVAC system to be inspected at least annually and problems found during the inspections to be corrected within a reasonable time. The employer is required to document in writing the name of the individual inspecting or maintaining the system, the date of the inspection and/or maintenance, and the specific findings and actions taken. The records are required to be retained for at least five years and made available for examination and copying,

within 48 hours of a request, to the Division of Industrial Relations, any employee of the employer, and to any designated representative of employees.

**Additional HVAC inspection requirements.** AB 2232 requires covered schools, which includes school districts, COEs, charter schools, private schools, CCCs, and CSUs, and requests the UC to, once every five years, inspect HVAC systems following prescribed requirements, as specified in the bill. The author states that this is necessary because the annual inspections required by Title 8 does not set forth specific testing requirements. According to the author, requirements for the HVAC inspection proposed by the bill are based on standards developed by the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). ASHRAE's website states the following: "ASHRAE, founded in 1894, is a global society advancing human well-being through sustainable technology for the built environment. The Society and its members focus on building systems, energy efficiency, indoor air quality, refrigeration and sustainability within the industry. Through research, standards writing, publishing and continuing education, ASHRAE shapes tomorrow's built environment today."

It is unclear whether the annual inspection conducted by school districts include any of the requirements proposed by this bill. **The Committee may wish to consider** whether specific requirements for inspecting HVAC systems should be codified. Once in law, any changes to recommended inspection requirements made by industry standards that require updates in the statute will have to be done legislatively.

The bill also requires HVAC testing to be performed by a Certified TAB Technician or a HVAC Acceptance Test Technician, and adjustments to be performed by a Certified TAB Technician. A "Certified TAB Technician" is defined as a technician certified to perform testing, adjusting, and balancing of HVAC systems by the Associated Air Balance Council, the National Environmental Balancing Bureau, or the Testing, Adjusting and Balancing Bureau. These organizations are national associations that certify individuals and firms in HVAC testing, adjusting and balancing based on education and examinations. It is unclear whether and how many school and college employees have any of these certifications.

A "HVAC Acceptance Test Technician" is defined as a technician certified to complete the forms set forth in Title 24 of the California Code of Regulations (state building standards code) by an Acceptance Test Technician Certification Provider approved by the CA Energy Commission to provide that certification. It is unclear whether and how many school and college employees have this approval.

The bill further requires documentation of the inspection and any repairs, adjustments, replacements, or other remedial actions that are made. This information must be kept for 10 years, five years more than the current requirement for maintaining records of annual inspections of HVAC systems.

**Carbon dioxide monitors.** Studies have found a link between low ventilation rates (supply of outdoor air) in classrooms and attendance, health and student performance. Adequate ventilation helps students be more alert and focused and is associated with fewer respiratory symptoms and absences due to illness. Ventilation standards are specified in Title 24 regulations. In a 2020 article, researchers at the Lawrence Berkeley National Laboratory and the Western Cooling Efficiency Center at UC Davis reported findings of a study of 11 K-12 schools, monitoring 104 classrooms, with ventilation rates of a majority of the classrooms exceeding the Title 24 level.

Carbon dioxide monitors can be used as a proxy for the level of ventilation in a classroom. When classrooms are empty, carbon dioxide levels will be lower. When classrooms are occupied, carbon dioxide levels will be higher as carbon dioxide is exhaled by the people in the room.

This bill requires all covered schools, and requests the UC, to ensure that all classrooms are equipped with specified carbon dioxide monitors, requires a classroom ventilation rate to be adjusted by a Certified TAB Technician to ensure that peak carbon dioxide concentrations in the classroom remain below the maximum allowable ppm setpoint, and requires a covered school and the UC, if it chooses, to keep a complete and accurate record for each incident where the carbon dioxide setpoint was exceeded in a classroom and a record of any remediation or adjustments that are made. These records are required to be maintained for five years and made available to the public upon request. The bill authorizes the DSA to make changes, through the regulatory process, to the types of monitors, where the monitors should be installed, and how the carbon dioxide monitors readings are to be displayed and notified. The language in this section of the bill is similar to provisions in AB 841 (Ting), Chapter 372, Statutes of 2020, which established the California Schools Healthy Air, Plumbing, and Efficiency Program to provide funds for local educational agencies to conduct HVAC assessment and repairs, and install carbon dioxide monitors. According to the California Department of Education, there were 10,545 schools in the state in 2020-21; and according to a 2018 Getting Down to the Facts report, an estimate of more than 300,000 classrooms.

***Carbon dioxide monitors to be required in new schools.*** The construction of school district, COE and CCC facilities is required to comply with Title 24 regulations. Beginning January 1, 2023, Title 24 requires carbon dioxide monitors to be installed in all new classrooms. According to the DSA, during the next Title 24 regulatory code cycle, carbon dioxide monitors for existing schools doing repairs or alterations may be considered. Charter and private schools are required to comply with local building codes and not Title 24 regulations. ***The Committee may wish to consider*** whether the regulatory process, rather than a mandate, should address carbon dioxide monitors in existing schools.

***Staffing required to monitor carbon dioxide levels?*** Adding carbon dioxide monitors alone will not improve ventilation in a classroom. Someone must monitor carbon dioxide monitor levels and make adjustments (e.g., adjust the air damper) to increase outdoor air into the building when rates exceed the recommended level. The bill requires use of monitors that provide readings on the monitor, a device, or electronically, such as a web-based application or cellular phone application, and an indicator when carbon dioxide levels exceed the specified level, such as through a visual indicator (light) on the monitor or other alert system. When the rate exceeds the specified level more than once a week, the bill requires a certified TAB technician to make adjustments. The bill doesn't require districts to identify staff to monitor readings. Some districts may have facilities staff capable of monitoring and making adjustments, although it is not known if they are TAB certified. It is unclear if most districts will have sufficient and adequate staff to monitor and make adjustments.

***Arguments in support.*** The U.S. Green Building Council supports the bill and states, “Under-ventilated schools are associated with increased transmission of infection, asthma exacerbation, cognitive impairment, and health impacts. This, in turn, affects how students learn. Students who attend schools with poor ventilation rates find it more challenging to learn, perform simple and complex tasks, and make decisions. Setting a minimum ventilation rate requirement would set

the expectation that fresh air is not something that is nice to have, but rather is *necessary* for students and teachers to function at school."

**Arguments in opposition.** The California Catholic Conference has an oppose unless amended position and states, "The goals and intent of AB 2232 are laudable. And while we agree that all of California's students should learn in modernized facilities, not all of California's schools have access to the same resources to that end. We would note that the Leroy F. Greene School Facilities Act of 1998 (California Education Code §§ 17070.10 – 17079.30), which serves as the legal anchor for AB 2232's proposed provisions, is specific to public schools. Nowhere in that Act's General Provisions (Ed. Code § 17070.10 – 17070.99) are private schools mentioned. Neither are private schools referenced in the Act's Modernization Eligibility Determination section (Ed. Code § 17073.10 – 17073.25). Further, the bill seemingly acknowledges that private educational entities (not entitled to receipt of state funding for purposes of modernizing, or otherwise improving physical facilities) ought not be made subject to AB 2232's provisions via the omission of private institutions of higher education from the bill's enumeration of 'covered schools.' Private K-12 schools should be similarly excluded."

**Related legislation.** AB 841 (Ting), Chapter 372, Statutes of 2020, establishes a program at the CA Energy Commission to fund appliance, plumbing and HVAC upgrades to schools using electric ratepayer-funded energy efficiency incentives.

AB 2162 (O'Donnell), of the 2019-20 Session, would have required a school district to ensure that school facilities meet the minimum requirements of regulations enacted by the Occupational Safety and Health Standards Board that govern the quality of air provided to employees in places of employment, and would have required school districts to use contractors who have been certified by a nationally recognized organization for the inspection, maintenance, and repair of HVAC systems. This bill was held in the Assembly Education Committee.

AB 2453 (Eduardo Garcia), Chapter 714, Statutes of 2018, authorizes a modernization apportionment from state school facilities bond funds to be used for air filtration systems. Authorizes a school or school district located in a community with a high cumulative exposure burden, as specified, to be eligible for grants as part of a community emissions reduction program to implement air quality mitigation efforts.

AB 1126 (Rendon), of the 2015-16 Session, would have required a COE, a school district and a public school, as specified, to post on its website: 1) the most recent date of a HVAC system inspection report, and 2) information on how to obtain the report. This bill was held in the Senate Appropriations Committee.

## **REGISTERED SUPPORT / OPPOSITION:**

### **Support**

U.S. Green Building Council

### **Opposition**

California Catholic Conference

**Analysis Prepared by:** Sophia Kwong Kim / ED. / (916) 319-2087