

# **Indoor Air Quality Management Plan**

**Des Moines Public Schools District**

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**Policies**

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## Indoor Air Quality Management Plan

### 1. INTRODUCTION

The health, comfort, and learning environment of students and staff are important aspects of Des Moines Public Schools (DMPS) mission. Indoor air quality (IAQ) is a critical component of providing a healthy and comfortable learning environment. DMPS IAQ goals are as follows.

1. Minimize indoor air pollutants, which will reduce the likelihood of health problems, including asthma, respiratory tract infections, allergic reactions, and other health problems.
2. Control temperature, humidity, and ventilation associated problems, which will foster students' ability to concentrate and learn.
3. Prevent indoor air quality problems, avoid school closures, minimize liability risks, and foster a positive relationship among parents, teachers, and the school administration.

DMPS has implemented an IAQ Management Plan that will monitor and improve the quality of air in school buildings. The objectives of the IAQ Plan are the following.

1. Reduce the levels of indoor air pollutants through preventive measures such as routine maintenance activities, periodic building evaluations and inspections, and IAQ-specific policies.
2. Provide and maintain adequate air exchanges by repairing and maintaining ventilation equipment.
3. Respond to IAQ-related concerns and problems in a thorough and prompt manner, through investigation, documentation, and effective communication.
4. Increase and enhance ventilation rates during renovation projects.

### 2. INDOOR AIR QUALITY COORDINATOR

DMPS has identified the Energy, Environmental and Safety Specialist (EESS) as the Indoor Air Quality Coordinator. The school administration and school board is committed to providing the necessary support to meet the IAQ Plan objectives. The IAQ Coordinator reports to the Director of Facilities Services.

The IAQ Coordinator's responsibilities include the following.

1. Answering parents' basic questions:
  - a. Where parents go to find answer to questions
  - b. Where parents can find self-help information and checklists to evaluate out-of-school situation. (*See attachment for resources for parents*).
  - c. How a parent can access to information about building and activities
  - d. What parents can do to change a situation in a school
2. Acting as the key contact person within the district authorized to respond to and address IAQ issues and concerns from parents, staff, and other local entities or referred by state agencies
3. Acting as the lead staff person to develop and manage the district's IAQ Management Plan, in accordance with the Department of Education (MDE) requirements. This includes coordinating:

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- a. annual building walkthrough inspections
- b. annual ventilation and maintenance evaluation
4. Managing or coordinating various IAQ projects
5. Managing compliance with other IAQ-related regulations, such as smoking, asbestos and lead.
6. Establishing, updating and leading the IAQ Plan.

### 3. BUILDING EVALUATION

School buildings are evaluated every year. The evaluations cover the ventilation systems and the maintenance activities. The ventilation evaluation checks: air intakes, air filters, condensate areas, coils, cleanliness, mechanical rooms, dampers, controls, air movement, exhaust. The maintenance evaluation checks: building supplies, dust control, floor cleaning, drain traps, moisture, and combustion appliances.

The IAQ in DMPS buildings are evaluated by conducting a detailed assessment every year. The purpose of this assessment is to identify and evaluate potential IAQ issues that may be associated with buildings or operations. Having the EESS or District environmental consultant evaluate building systems ensures an individual with expertise examines all areas of the buildings every year.

The IAQ Coordinator developed the evaluation method, which is equivalent to the Tools for Schools walkthrough, ventilation, and maintenance checklists. (*See checklists*) This evaluation is like a ‘super walkthrough’ inspection, because it goes beyond an overview walkthrough inspection and has additional focus on the ventilation systems and maintenance operations.

The IAQ Coordinator reviews findings and drafts ideas to address findings. If the causes of problems cannot be identified, yet concerns exist, a different evaluation method may be used. Information from evaluation is used during the walkthrough inspections to verify or further investigate the issue. Records of yearly evaluations are kept in Facility Services office.

### 4. WALKTHROUGH INSPECTION

An IAQ walkthrough inspection is conducted annually of the functional spaces in all the buildings that house administrative or educational operations. The purpose of the walkthrough inspection is to identify new problems, further evaluate problems identified previously, and confirm repairs and other changes. The inspection is a quick overview of each building, and a more detailed evaluation is conducted through the building systems evaluations (see Section 4). The walkthrough inspections provide some insight regarding the type, location, and magnitude of apparent IAQ-related issues and problems.

The walkthrough inspections assess IAQ through the use of general human senses. The inspections check the occupied spaces (classrooms, hallways, offices, kitchens) and other

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‘functional’ areas (exterior, roof, mechanical rooms, bathrooms, storage rooms, and boiler). The walkthrough checks for problems related to: cleaning, fresh air ventilation, pests, nearby pollutants, pesticides, moisture, walk-off mats, temperature, humidity, odors, mold, occupant concerns, dry drain traps, exhaust ventilation, chemicals, fuel containers, engines, combustion appliances, lead, and radon. Asbestos inspections are conducted as part of AHERA requirements.

The following issues are emphasized:

1. Water intrusion problems (interior and exterior)
2. Ventilation failures and/or problems
3. Building/structural failures and/or problems
4. Cleanliness of buildings and classrooms
5. Need for O&M programs (e.g. ventilation, carpet, building compounds)

Copies of the walkthrough checklists are kept with the IAQ Plan in.

### 5. PLAN TO ADDRESS IDENTIFIED ISSUES

During the walkthrough inspections and building systems evaluations IAQ Coordinator identifies IAQ problems and issues. The issues are prioritized from most important to least important, and tracked in the “Plan to Address Identified Issues Table”. (*See attachment for Plan to Address Identified Issues*)

Issues are categorized and addressed through one or more the following methods:

1. Completing one-time repairs (immediate or near future actions)
2. Scheduling and executing mid- to long- term projects
3. Identifying deferred maintenance items that may be addressed if/when funding allows
4. Adopting new policies and practices as part of the IAQ Plan

This plan has an implementation schedule that describes the timeline to remediate known IAQ issues. The plan also assigns a person as responsible for completing the task or overseeing the work. A new plan to address identified issues is created every year, after building systems evaluations and walkthrough inspection. Responses to particular staff concerns and complaints are managed separately, as described under Section 8, but summary information may be included “Plan to Address Identified Issues Table”.

### 6. COMMUNICATION

Communication is a critical element to successfully manage IAQ. The IAQ Coordinator and other district authorities try to limit misinformation and confusion through the use of effective communication. The IAQ Coordinator and other district employees communicate with relevant parties in a prompt, courteous, and consistent manner until the issue is resolved to the greatest extent possible. It is the goal of DMPS to develop and maintain the trust of the community and staff.

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The IAQ Coordinator is prepared to answer parents' basic questions, as described in Section 2. A list of checklists and other 'self-help' information, which parents can use to evaluate IAQ at home, can be found in Attachment 4. This information is provided to parents to complement efforts to evaluate possible problems in the school, and is not intended to divert attention from the school.

In the unlikely event of an IAQ emergency, the district will strive to accommodate the needs of students, parents, and staff. The media will be alerted when it is necessary to provide information to a broader audience. Every effort will be made to share appropriate information as soon as it becomes available to the school district.

## 7. COMPLAINTS

DMPS encourages the reporting of IAQ concerns, regardless of how trivial the issue may seem. The prompt reporting and resolution of IAQ issues has the potential to prevent serious problems from developing, which should prevent potential health effects, discomfort, and unnecessary costs. This makes the investigation of all reported concerns worthwhile.

The IAQ Coordinator will require concerned individuals report their IAQ concern in writing. A written description of the concern should reduce misunderstanding and create a history that can be referred to at a future date. The "IAQ Concern Reporting Form", (*see attachment for Indoor Air Quality Concern Forms*), is made available to staff and parents. This form should be completed and sent to the IAQ Coordinator to initiate an official IAQ concern reporting process.

The IAQ Coordinator investigates the concern using necessary documents and resources and the "IAQ Concern Reporting Form". The IAQ Coordinator documents findings and any changes implemented. The IAQ Coordinator reports the measures taken and the resolution of the identified concern to the appropriate parties. This will ensure that all interested parties know what action(s) have been taken. Where possible, the resolution of the issue, to the satisfaction of the concerned individual, is also documented.

If the problem cannot be identified or persists despite the school staff's efforts to identify and remediate it, the IAQ Coordinator discusses the matter with the appropriate school official(s) in order to determine whether a contracted service provider is needed. When the problem requires a policy change or significant resources, the IAQ Coordinator discusses specific policy changes or needed resources with the Facility Services Director.

Completed IAQ concern forms and associated documents are stored in the facility services office and on-line. Information collected is processed and stored according to data practices policies. Findings and changes associated with reported concerns are reviewed during the annual review, or sooner if needed, to determine whether changes to the IAQ Plan are warranted.

## **8. PREVENTIVE MAINTENANCE AND OPERATIONS**

Preventive maintenance means the routine inspection, adjustment, and repair of building structures and systems, including the heating, ventilating, and air conditioning system (HVAC), local exhaust, and flooring. Preventive maintenance plays a major role in maintaining the quality of air, by assuring that the building systems are operating effectively and efficiently. Moreover, it helps to maintain a comfortable temperature and humidity in occupied spaces.

DMPS preventive maintenance schedules for each building is located in the District operations office. It describes the building and ventilation components that are inspected and maintained on a routine basis. The schedule was established using the past experience with maintenance professionals, the availability of resources, and technical guides, including the manufacturer's specifications. The person performing the preventive maintenance follows the checklist strictly, and the Preventative Maintenance Specialist monitors its completion. All records of completed preventive maintenance are kept in the District operations office.

To the extent possible, school officials try to maintain the school buildings according to the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) recommended parameters described in standards 55 and 62. If the current parameters cannot be met, school staff will make ventilation adjustments that provide a fresh air delivery, temperature, and humidity level that are as close to the ASHRAE standard.

## **9. TRAINING**

All district employees play an important role in maintaining and improving air quality. Staff behaviors can affect air quality in a room and specific staff need to be aware of policies. An informed employee is more likely to take steps to maintain good air quality. In addition, an employee with an understanding of IAQ is more likely to report IAQ concerns quickly and accurately. For these reasons, the DMPS staff is educated about IAQ.

DMPS performs an annual IAQ training session of all operations staff, as part of the employee right to know. The IAQ Coordinator or other qualified person performs the training.

In addition to the general training, specific staff receives training related to their areas.

1. Teachers: animals, food, plants, furniture, clutter, chemicals, air movement, sensitive students
2. Bus drivers: idling
3. Custodians: cleaning, moisture, chemicals, problems
4. Facilities: pesticides, chemicals, grass clippings away from unit vents, ventilation, operations, maintenance, moisture

## **10. ANNUAL REVIEW**

DMPS performs an annual review of the IAQ Plan, in order to make appropriate changes. The annual review is necessary because changes may occur, related to the building, operations, maintenances, occupants, and the administration's priorities. Earlier versions of the IAQ Plan and the yearly "Plan to Address Identified Issues" are retained to provide a history of IAQ that should reduce the likelihood of repeating policies and procedures that were ineffective or inefficient.

The annual review involves:

1. Ensuring a certified IAQ Coordinator
2. Walkthrough inspections
3. Building systems evaluations
4. Reviewing IAQ Concern Reports and other information
5. Creating a "Plan to Address Identified Issues"
6. Changing the IAQ Management Plan as needed

## **11. MERCURY**

Mercury can affect the nervous system. It can be found in areas where previous spills occurred, in certain building materials, in certain instruments, or stored in old containers. Staff is prohibited from bringing any mercury containing chemicals, instruments, or materials to school.

While mercury is prohibited, in our schools, in the unlikely event that mercury is brought to school, school staff is prepared to respond to a mercury spill. In the event of a spill, school staff will contact Facility Services office at 242-7706. Students will be removed from the affected area, which will then be isolated from the rest of the building. Mercury spill clean-up kits will be used for small spills (one thermometer or less). In larger spills, school staff will contact the Facility Services office and needed response agencies will be contacted.

## **12. ASBESTOS**

Asbestos is a mineral fiber that can be found in some building materials. When these materials are damaged or disturbed, they release asbestos fibers into the air. Airborne asbestos fibers pose an increased health risk for mesothelioma, lung cancer, and asbestosis.

In compliance with federal law, DMPS has developed and maintains an Asbestos Hazard Emergency Response Act (AHERA) Management Plan. This plan reduces the likelihood of exposure to asbestos. Asbestos containing materials are regularly inspected. Removal is done safely, following applicable state and federal laws. The AHERA plan is available for review and located in Facility Service office.

### **13. INTEGRATED PEST MANAGEMENT**

Integrated Pest Management (IPM) is an important strategy for maintaining good IAQ because both pests (such as mice and cockroaches) and pesticides can cause health problems, such as allergies and asthma. The DMPS IPM program will reduce the frequency and magnitude of both pesticide use and pest problems.

The school strives to minimize pesticide use and utilize non-chemical options where feasible. Individuals that apply certain pesticides must be properly licensed by the Iowa Department of Agriculture.

### **14. LEAD**

Lead can be found in paint and varnishes, in pre-1978 building structures, and possibly other materials and items. When lead is released as dust or chips, individuals may inhale or ingest the lead. This can affect the nervous system, and young children are particularly susceptible.

The DMPS has determined the areas that have lead paint in child occupied facilities, as defined by Iowa Department of Public Health. When renovation that disturbs this paint is conducted, lead-safe work practices are employed that minimize the exposure of building occupants to airborne lead-based paint particles.

In addition, the DMPS complies with the new federal (TSCA Section 402c3) lead renovation, renovation and painting rule (RRP), which applies to rooms used by children under the age of six. When work that disturbs paint is being planned in these areas, the school will determine whether the paint contains lead. If lead is present, then the renovation will be managed by the district employee who is a certified renovator or hired certified contractor. Specific work-practices will be employed to prevent lead contamination of the building, as specified in federal regulations.

Additional information about the lead policy and compliance with RRP can be found in the Facility Service office.

### **15. RADON (*see radon plan*)**

### **16. RENOVATION**

The DMPS considers IAQ when planning construction and renovation projects. Proposed renovations are evaluated in relation to the school's history of IAQ findings and concerns reported. This history is summarized in the yearly "Plan to Address Identified Issues". In addition, the presence of lead, asbestos and other possible hazards are evaluated prior to renovation, and school staff complies with relevant regulations [*see Asbestos and Lead Sections*].

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If renovation projects must be performed while school is in session, the return air from any area being renovated is isolated from the main ventilation system. Other engineering controls, such as plastic sheeting and local exhaust ventilation, may be used to contain and minimize the distribution of dust and other contaminants produced by construction activities. Cleaning operations are more frequent during and after renovation. The use of environmentally preferable building materials and products are specified in renovation and construction projects, where cost and quality are similar to conventional materials, such as Green Guard, Green Seal, Green Label, and ANSI 208 certified.

### **17. MICROBIAL PREVENTION AND REMOVAL**

Microbial organisms, such as fungi (for example, mold) and bacteria can cause illness (such as allergies, asthma), costly damage, and discomfort. Microbes need moisture, a food source (such as drywall) and other particular conditions to grow. Moisture control is emphasized to prevent and manage microbial growth, because the easiest way to control microbial growth.

DMPS officials pay close attention to water intrusion and microbial growth during the walkthrough inspections, buildings systems evaluations, preventive maintenance activities, and the investigation of reported concerns. The maintenance staff has received basic training about identifying moisture problems. School staff is expected to address problems in a prompt manner.

Materials damaged by water are replaced when possible (e.g., ceiling tiles, boxes, books). Materials that cannot be replaced and must be kept (e.g., carpets, sheet rock, insulation, structural lumber, etc) are dried, preferably within 24 hours, but no later than 48 hours. Porous materials that remain wet longer or items wetted with dirty water are evaluated on a case-by-case basis, but these are usually replaced.

Materials contaminated with microbial growth are promptly cleaned or replaced. Microbial growth is removed from non-porous surfaces by cleaning with a detergent, followed by application of an anti-microbial cleaner (where necessary), and then thorough drying. Porous materials that are contaminated are typically replaced.

Microbial or moisture problems that are difficult to identify or remediate are contracted to a professional. The DMPS has contracted with an environmental consultant to investigate mold and moisture problems, while large clean-up projects are handled by the environmental consultant. Large-scale remediation projects also follow the guidelines in Section 20. Additional control and protection measures may be necessary where microbial growth is present or suspected; the DMPS expects the contracted companies and school staff to follow guidelines from USEPA, MDH, IICRC, AIHA, and IAQA.

### **18. ANIMALS IN SCHOOL BUILDINGS**

Animals can be a source of allergens that cause allergy and asthma symptoms, microorganisms that can cause infectious diseases, and bites or stings. DMPS has adopted an animal policy that

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strives to minimize animal-related health problems while recognizing the positive educational role animals can have in schools.

Information gathered from walkthrough inspections, building systems evaluations, IAQ concern reports, and staff meetings is used to create and update this policy. Specific types of animals will be restricted if a valid concern is expressed by staff, students or parents. DMPS reserves the right to ban certain animals if they pose a threat to the safety or well-being of staff and students.

This policy does not apply to companion animals, which are permitted in the school building. If or when animals are brought to school on a temporary basis (e.g., 'show and tell' events), the event will be held, where possible, outdoors or in a room with a hard floor (e.g., gym).

Cold-blooded animals (fish, reptiles, amphibians) are recommended over warm-blooded, furry or feathered animals. Before an animal is brought to a classroom, the teacher must request permission from the building administrator. If a known sensitive individual is present or uses the room, then the request may be denied.

If an animal is permitted, the responsible staff person is expected to watch for any obvious health symptoms that may be related to the animals, such as allergy or asthma symptoms. The staff person is also responsible for the care of the animal, including cleaning and maintenance of the habitat and other areas that may become soiled. Staff and students' hands must be washed after handling animals or contacting their waste. Animals must be kept in an appropriate habitat when they are not being used for education. They should be kept away from carpeted areas in order to minimize the transfer of allergens to and soiling the carpets. Finally, animals should be kept away from air supply and return vents.

## **19. CLEANING AND CHEMICALS**

Regular and thorough cleaning is an important means for the removal of air pollutant sources; however, the cleaning products themselves release chemicals into the air. Keeping flooring and furniture clean can help to minimize dust, allergens, and the likelihood of mold growth (if the flooring becomes wet). To ensure that cleaning practices remove pollutant sources while using cleaning products appropriately, cleaning guidelines have been created.

1. Custodial cleaning products are stored in a secure area. All bottles must be clearly labeled. Bottles of cleaning agents must be closed tightly when stored. Products are stored in rooms with local exhaust ventilation.
2. Environmentally preferable ('green') products are used, such as Green Seal certified or equivalent products, where cost and performance are comparable to conventional cleaning products.
3. HEPA-filtered vacuum cleaners are used to clean carpeting.
4. Microfiber cloths are used to clean hard floors and smooth surfaces.
5. Teachers and other staff are provided a green cleaner for spot cleaning. Staff are not permitted to bring cleaning products from home.

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6. All material safety data sheets are stored in an area available to all staff, and the location of this information is discussed in the district's "Employee Right to Know" annual training.
7. Most cleaning and other maintenance is completed during unoccupied hours. Most routine cleaning is performed after school.
8. The building and rooms are maintained at reasonable cleanliness. Each building's operations and maintenance schedule specifies the cleaning and maintenance schedule for flooring, entry mats, and furnishings.

## 20. FLOORING AND FURNISHING

New flooring and furniture will emit volatile organic compounds, which may irritate occupants' airways. Older furniture and flooring accumulate dust and allergens, which can be released into the air from time to time. If porous flooring or furniture becomes wet, they can develop mold growth.

When performing building systems evaluations, walkthrough inspections, and reviewing concern reports, the condition of flooring and furnishings is evaluated. Where persistent problems are found, the flooring or furniture is replaced, preferably with low-maintenance and smooth surfaced flooring and furniture.

Flooring and furniture are cleaned according to the operations and maintenance schedule. Carpets are vacuumed and hard flooring mopped and or scrubbed daily. In addition, carpet extraction cleaning is conducted and hard flooring is refinished according to building schedules. Carpeting is not cleaned during summer months unless the carpet can be dried within 24 hours. After deep cleaning, carpeting may be dried with floor fans, dehumidifiers, continuous operation of the ventilation system. Hard flooring is re-finished during the summer using environmentally preferable products.

When purchasing flooring and furniture, DMPS prefers environmentally preferable products, such as Green Guard or Green Label products. All purchased flooring must be free of mercury. Staff is not allowed to bring personal furniture or area rugs to school. DMPS approves and purchases furniture that is used on school property.

## 21. PLANTS *[optional]*

Individuals can be allergic to certain plants, such as cut flowers and flowering plants. In addition, mold can grow on the soil, plant or pot. Due to prior problems with plants in school buildings, DMPS has adopted a plant policy.

Flowers and flowering plants are discouraged; flowers delivered should be taken home at the end of the day. Staff is responsible for plants in their area, and should immediately clean up any water or dirt that spills out of the plant. Plants should not be over-watered and cannot be placed

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on carpet, ventilators, or where accidental over-watering can cause problems. Plants that develop mold (on leaves, on soil, or pot) must be removed.

## 22. EMERGENCY RESPONSE

Emergencies are defined as situations that require immediate action. IAQ-related emergencies include situations that are potentially life threatening, such as the following.

1. Widespread and sudden complaints of headaches and nausea or combustion odors
2. Diagnosed Legionnaire's disease or tuberculosis
3. Liquid spills (e.g., mercury) or gaseous leaks (e.g., pool chlorine) of hazardous materials.

In addition, emergencies include situations where there is limited time available to prevent serious property damage or health problems, such as major flooding.

Emergencies are determined on a case-by-case basis, using the above definition as a general guideline only. If doubt exists about whether exposure to a specific hazard constitutes an emergency, a precautionary approach may be used where the matter is handled as an emergency. Non-emergency situations are addressed according to the "Complaints" Policy, Section 8.

Response actions will be conducted in accordance with EPA mold remediation in schools and commercial buildings. See EPA document *Mold Remediation in Schools and Commercial Buildings* for specific details.

Training: all operations and facility services employees will be instructed in USEPA mold course.

# **List of Information Resources for Parents to Assess Home**

The following websites are portals to specific fact sheets, checklists, and other information related to IAQ in the home environment. Topics include mold, carbon monoxide, radon, chemicals, asbestos, and lead.

## **Indoor Air Quality Fact Sheets (US Environmental Protection Agency)**

[www.epa.gov/iaq/index.html](http://www.epa.gov/iaq/index.html)

## **Making Homes Healthier for Families (US Department of Housing and Urban Development)**

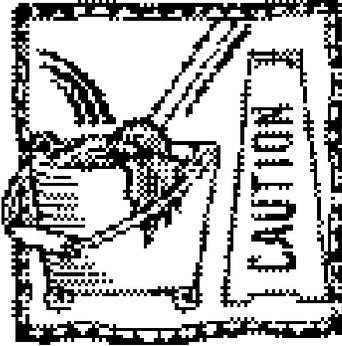
[www.hud.gov/offices/lead/healthyhomes/index.cfm](http://www.hud.gov/offices/lead/healthyhomes/index.cfm)

## **Environmental Health (Center for Disease Control)**

[www.cdc.gov/Environmental/](http://www.cdc.gov/Environmental/)

## **Creating Healthy and Safe Homes for Children (National Center for Healthy Housing)**

<http://www.nchh.org/>



# Building and Grounds Maintenance Checklist

Name: \_\_\_\_\_

School: \_\_\_\_\_

Room or Area: \_\_\_\_\_ Date Completed: \_\_\_\_\_

Signature: \_\_\_\_\_

**Instructions**

1. Read the *IAQ Backgrounder* and the Background Information for this checklist.
2. Keep the Background Information and make a copy of the checklist for future reference.
3. Complete the Checklist.
  - Check the “yes,” “no,” or “not applicable” box beside each item. (A “no” response requires further attention.)
  - Make comments in the “Notes” section as necessary.
4. Return the checklist portion of this document to the IAQ Coordinator.

## 1. BUILDING MAINTENANCE SUPPLIES

	Yes	No	N/A
1a. Developed appropriate procedures and stocked supplies for spill control .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1b. Reviewed supply labels .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1c. Ensured that air from chemical and trash storage areas vents to the outdoors .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1d. Stored chemical products and supplies in sealed, clearly labeled containers .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1e. Researched and selected the safest products available .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1f. Ensured that supplies are being used according to manufacturers’ instructions.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1g. Ensured that chemicals, chemical-containing wastes, and containers are disposed of according to manufacturers’ instructions.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1h. Substituted less- or non-hazardous materials (where possible) .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1i. Scheduled work involving odorous or hazardous chemicals for periods when the school is unoccupied .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1j. Ventilated affected areas during and after the use of odorous or hazardous chemicals .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## 2. GROUNDS MAINTENANCE SUPPLIES

2a. Stored grounds maintenance supplies in appropriate area(s) .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2b. Ensured that supplies are used and stored according to manufacturers’ instructions.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2c. Established and followed procedures to minimize exposure to fumes from supplies .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2d. Reviewed and followed manufacturers’ guidelines for maintenance .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2e. Replaced portable gas cans with low-emission cans.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2f. Stored chemical products and supplies in sealed, clearly-labeled containers .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2g. Ensured that chemicals, chemical-containing wastes, and containers are disposed of according to manufacturers’ instructions.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## 3. DUST CONTROL

3a. Installed and maintained barrier mats for entrances .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3b. Used high efficiency vacuum bags .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3c. Used proper dusting techniques .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3d. Wrapped feather dusters with a dust cloth .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3e. Cleaned air return grilles and air supply vents.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

#### 4. FLOOR CLEANING

- |  | Yes                      | No                       | N/A                      |
|--|--------------------------|--------------------------|--------------------------|
| 4a. Established and followed schedule for vacuuming and mopping floors ..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4b. Cleaned spills on floors promptly (as necessary) .....                   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4c. Performed restorative maintenance (as necessary) .....                   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

#### 5. DRAIN TRAPS

- |   |                          |                          |                          |
|---|--------------------------|--------------------------|--------------------------|
| 5a. Poured water down floor drains once per week (about 1 quart of water) ..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5b. Ran water in sinks at least once per week (about 2 cups of water) .....     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5c. Flushed toilets once each week (if not used regularly) .....                | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |



#### 6. MOISTURE, LEAKS, AND SPILLS

- |   |                          |                          |                          |
|---|--------------------------|--------------------------|--------------------------|
| 6a. Checked for moldy odors .....   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6b. Inspected ceiling tiles, floors, and walls for leaks or discoloration (may indicate periodic leaks) ..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6c. Checked areas where moisture is commonly generated (e.g., kitchens, locker rooms, and bathrooms) .....    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6d. Checked that windows, windowsills, and window frames are free of condensate .....                         | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6e. Checked that indoor surfaces of exterior walls and cold water pipes are free of condensate .....          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6f. Ensured the following areas are free from signs of leaks and water damage:                                |                          |                          |                          |
| Indoor areas near known roof or wall leaks .....  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Walls around leaky or broken windows .....  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Floors and ceilings under plumbing .....  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Duct interiors near humidifiers, cooling coils, and outdoor air intakes .....                                 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

#### 7. COMBUSTION APPLIANCES

- |  |                          |                          |                          |
|--|--------------------------|--------------------------|--------------------------|
| 7a. Checked for odors from combustion appliances .....                             | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7b. Checked appliances for backdrafting (using chemical smoke) .....               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7c. Inspected exhaust components for leaks, disconnections, or deterioration ..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7d. Inspected flue components for corrosion and soot .....                         | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

#### 8. PEST CONTROL

- |   |                          |                          |                          |
|---|--------------------------|--------------------------|--------------------------|
| 8a. Completed the <i>Integrated Pest Management Checklist</i> ..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|---|--------------------------|--------------------------|--------------------------|

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#### NOTES



### Instructions

Read this section before completing the Building and Grounds Maintenance Checklist.

# Background Information for Building and Grounds Maintenance Checklist

## BUILDING MAINTENANCE SUPPLIES

Maintenance supplies can emit air contaminants during use and storage. Products that are lower in emissions are not necessarily less hazardous. Examples of maintenance supplies that may contribute to indoor air quality (IAQ) problems include caulks, solvents, paints, adhesives, sealants, gasoline, fertilizers, pesticides, and cleaning agents.

Be sure to review all instructions for maintenance supplies and follow appropriate safety, handling, disposal, and storage practices. Establish maintenance schedules and practices that minimize occupant exposure to hazardous materials.

## GROUNDS MAINTENANCE SUPPLIES

Grounds maintenance supplies include equipment, fertilizers, and portable gasoline containers. These supplies should be stored outside the main school building in a well-ventilated area (preferably in a locked facility) to minimize human exposure to pollutants.

If you are storing the equipment for a long period of time (for example, over the winter), empty the gas tank or use a stabilizer. Remember to maintain equipment according to the manufacturer's guidelines. Maintenance remains an easy, low-cost way to reduce emissions and achieve the best fuel economy.

Portable gasoline containers can be a pollution source, even when not in use. Low-emission gas cans reduce evaporation and spillage and offer an affordable option to schools. Check the gasoline cans your school uses and consider using only low-emission cans.

## DUST CONTROL

Maintain a cleaner school with reduced effort by using two simple techniques:

- Reduce the amount of dust and dirt that enters the school.
- Reduce the amount of dust released from vacuum bags and dust cloths.

Cleaner schools positively affect students and staff both physically and psychologically. Buildings with high dust levels have been associated with increased complaints, illnesses, and discomfort. Specifically, dust mites have been found to trigger asthma attacks. In addition to dust, these techniques reduce other particles (such as pollens), that are known to cause allergic reactions.

Schools may want to place barrier floor mats at all entrances. These mats need to be long enough to allow five full steps for people entering the school. Most dirt will fall off on the mats rather than throughout the entire school, saving cleaning costs. Vacuum each barrier mat daily using a beater brush or beater bar vacuum. Always vacuum in two directions (in-line and side-to-side).

Use high-efficiency vacuum bags. Standard paper or cloth bags allow dust to pass completely through the vacuum and back into the air and onto surfaces. When possible, use micro-filtration bags that retain dust and particles in the 3 micron size range or even smaller. Although these bags cost more initially, using them can reduce labor costs. When dusting, ensure dust is collected and not released back into the air. Use wet cloths to collect dust, and dust in a circular motion rather than a flicking motion.

Periodically clean air supply vents and return grilles, as well as the ceiling and wall surfaces adjacent to the grilles and vents. Remove all visible dust.

## FLOOR CLEANING

All flooring—including vinyl, wood, terrazzo, tile, and carpet—requires daily attention to ensure cleanliness. Contact floor suppliers or manufacturers for recommended maintenance techniques and follow specific guidelines for properly maintaining carpets. Determine the appropriate frequency of vacuuming required for each area. (Guidelines are available from the Carpet and Rug Institute at (800) 882-8846 or [www.carpet-rug.com](http://www.carpet-rug.com); see **Appendix L: “Resources”** in the *IAQ Reference Guide*).

Use a vacuum with brushes, beater bars, strong suction, and a high-efficiency filter bag that will filter particles down to the 3 micron or smaller range. Remove spots and stains immediately. Use care to prevent excess moisture to ensure that cleaned areas will dry quickly.

Perform restorative maintenance as necessary (for example, stripping and recoating floors or intensively cleaning carpets). The Carpet and Rug Institute recommends periodic extraction cleaning (wet or dry); be sure to remove all moisture and cleaning agents after cleaning.

## DRAIN TRAPS

Drain traps in the floor, if present, can become a problem when the water in the drain trap evaporates due to infrequent use, allowing sewer gases to enter the room. Periodically pour water into sinks and drains, and flush unused toilets at least once a week.

## MOISTURE, LEAKS, AND SPILLS

Water (leaks, spills, puddles) and excess moisture (condensation, humidity) contribute to mold growth. Mold can trigger allergic reactions and asthma episodes, cause odors, and lead to a variety of other IAQ problems.

## Inspect the building for signs of moisture, leaks, or spills.

- Check for moldy odors.
- Look for stains or discoloration on the ceiling, walls, or floors.
- Check cold surfaces (e.g., under windows, corners formed by exterior walls, and cold water piping) for condensation.
- Check areas where moisture is generated (e.g., kitchens, locker rooms, and bathrooms).
- Look for signs of water damage in—
  - Indoor areas near known roof or wall leaks.
  - Walls around leaky or broken windows.
  - Floors and ceilings under plumbing.
  - Duct interiors near humidifiers, cooling coils, and outdoor air intakes.

If you discover leaks during your inspection, note their location(s) on your floor plan and repair them as quickly as possible.

## Respond promptly when you see signs of moisture or when leaks or spills occur.

- Clean and dry damp or wet building materials and furnishings.
- Work with manufacturers of furnishings and building materials to learn about recommended cleaning procedures; also, identify competent contractors who can clean damp materials.
- Dry porous, absorbent building materials or furnishings (e.g., ceiling tiles, wall boards, and floor coverings) within 48 hours. Materials may need to be discarded if they cannot be dried and cleaned within 48 hours. In this situation, identify and correct the source of the moisture problem before replacing materials.





### **Prevent moisture condensation.**

- Reduce the potential for condensation on cold surfaces (piping, exterior walls, roof, or floor) by adding insulation.
- Raise the air temperature.
- Improve air circulation in the problem location.
- Supply more outdoor ventilation air (especially in drier climates or during winter).
- Use a dehumidifier or desiccants to dry the air. (For more information, see **Appendix H: “Mold and Moisture”** in the *IAQ Reference Guide*.)
- Increase the capacity or operating schedule of existing exhaust fan(s); or add a local exhaust fan near the source of the water vapor.

*NOTE: When installing insulation that has a vapor barrier, place the vapor barrier on the warm side of the insulation.*

### **COMBUSTION APPLIANCES**

Combustion appliances (such as kerosene heaters and unvented gas stoves and heaters) may be sources of carbon monoxide and other gases. Because carbon monoxide is toxic and odorless, ensure that appliances are properly vented to remove this gas. If adequate combustion air is not available to an appliance, combustion gases may be drawn (backdrafted) indoors instead of exhausted outside.

### **Note odors when first entering a location containing combustion appliances.**

Your nose can quickly become accustomed to odors, but upon first entering a room, you may notice the smell of combustion gas odors, indicating a possible leak or backdrafting problem.

### **Visually inspect exhaust components.**

- Inspect flue components for leaks, disconnections, and deterioration.
- Inspect flue components for corrosion and soot.

### **Check for backdrafting of combustion appliances.**

Use chemical smoke to determine whether air is flowing up the flue of combustion appliances. Simply puff smoke near any vent openings or joints and observe the direction of the smoke. Ensure that the appliances are operating and that the building ventilation systems are in normal operating mode when performing this activity.

### **PEST CONTROL**

Complete the Integrated Pest Management Checklist to ensure the school is using the most effective, environmentally-sound pest management strategies available. (See **Appendix K: “Integrated Pest Management”** in the *IAQ Reference Guide* for additional information.)



# Ventilation Checklist

Name: \_\_\_\_\_

School: \_\_\_\_\_

Unit Ventilator/AHU No: \_\_\_\_\_

Room or Area: \_\_\_\_\_ Date Completed: \_\_\_\_\_

Signature: \_\_\_\_\_

## Instructions

1. Read the *IAQ Backgrounder* and the Background Information for this checklist.
2. Keep the Background Information and make a copy of the checklist for **each** ventilation unit in your school, as well as a copy for future reference.
3. Complete the Checklist.
  - Check the “yes,” “no,” or “not applicable” box beside each item. (A “no” response requires further attention.)
  - Make comments in the “Notes” section as necessary.
4. Return the checklist portion of this document to the IAQ Coordinator.

## 1. OUTDOOR AIR INTAKES

- |   |                          |                          |                          |
|---|--------------------------|--------------------------|--------------------------|
| 1a. Marked locations of all outdoor air intakes on a small floor plan (for example, a fire escape floor plan) ..... | Yes                      | No                       | N/A                      |
| 1b. Ensured that the ventilation system was on and operating in “occupied” mode .....                               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

### ACTIVITY 1: OBSTRUCTIONS

- |  |                          |                          |                          |
|--|--------------------------|--------------------------|--------------------------|
| 1c. Ensured that outdoor air intakes are clear of obstructions, debris, clogs, or covers .....                 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1d. Installed corrective devices as necessary (e.g., if snowdrifts or leaves frequently block an intake) ..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

### ACTIVITY 2: POLLUTANT SOURCES

- |  |                          |                          |                          |
|--|--------------------------|--------------------------|--------------------------|
| 1e. Checked ground-level intakes for pollutant sources (dumpsters, loading docks, and bus-idling areas).....   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1f. Checked rooftop intakes for pollutant sources (plumbing vents; kitchen, toilet, or laboratory exhaust fans; puddles; and mist from air-conditioning cooling towers)..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1g. Resolved any problems with pollutant sources located near outdoor air intakes (e.g., relocated dumpster or extended exhaust pipe).....                                   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

### ACTIVITY 3: AIRFLOW

- |   |                          |                          |                          |
|---|--------------------------|--------------------------|--------------------------|
| 1h. Obtained chemical smoke (or a small piece of tissue paper or light plastic) ..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 1i. Confirmed that outdoor air is entering the intake appropriately .....             | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

## 2. SYSTEM CLEANLINESS

### ACTIVITY 4: AIR FILTERS

- |  |                          |                          |                          |
|--|--------------------------|--------------------------|--------------------------|
| 2a. Replaced filters per maintenance schedule .....  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2b. Shut off ventilation system fans while replacing filters (prevents dirt from blowing downstream) ..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2c. Vacuumed filter areas before installing new filters .....  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2d. Confirmed proper fit of filters to prevent air from bypassing (flowing around) the air filter .....    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2e. Confirmed proper installation of filters (correct direction for airflow).....                          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

## 2. SYSTEM CLEANLINESS (continued)

### ACTIVITY 5: DRAIN PANS

- |   | Yes                      | No                       | N/A                      |
|---|--------------------------|--------------------------|--------------------------|
| 2f. Ensured that drain pans slant toward the drain (to prevent water from accumulating) ..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2g. Cleaned drain pans.....   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2h. Checked drain pans for mold and mildew .....  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

### ACTIVITY 6: COILS

- |  |                          |                          |                          |
|--|--------------------------|--------------------------|--------------------------|
| 2i. Ensured that heating and cooling coils are clean ..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|--|--------------------------|--------------------------|--------------------------|

### ACTIVITY 7: AIR-HANDLING UNITS, UNIT VENTILATORS

- |   |                          |                          |                          |
|---|--------------------------|--------------------------|--------------------------|
| 2j. Ensured that the interior of air-handling unit(s) or unit ventilator (air-mixing chamber and fan blades) is clean ..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2k. Ensured that ducts are clean.....   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

### ACTIVITY 8: MECHANICAL ROOMS

- |  |                          |                          |                          |
|--|--------------------------|--------------------------|--------------------------|
| 2l. Checked mechanical room for unsanitary conditions, leaks, and spills .....                                     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2m. Ensured that mechanical rooms and air-mixing chambers are free of trash, chemical products, and supplies ..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

## 3. CONTROLS FOR OUTDOOR AIR SUPPLY

- |  |                          |                          |                          |
|--|--------------------------|--------------------------|--------------------------|
| 3a. Ensured that air dampers are at least partially open (minimum position).....   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3b. Ensured that minimum position provides adequate outdoor air for occupants..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

### ACTIVITY 9: CONTROLS INFORMATION

- |   |                          |                          |                          |
|---|--------------------------|--------------------------|--------------------------|
| 3c. Obtained and reviewed all design inside/outside temperature and humidity requirements, controls specifications, as-built mechanical drawings, and controls operations manuals (often uniquely designed) ..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|---|--------------------------|--------------------------|--------------------------|

### ACTIVITY 10: CLOCKS, TIMERS, SWITCHES

- |   |                          |                          |                          |
|---|--------------------------|--------------------------|--------------------------|
| 3d. Turned summer-winter switches to the correct position .....                                       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3e. Set time clocks appropriately.....  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3f. Ensured that settings fit the actual schedule of building use (including night/weekend use) ..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

### ACTIVITY 11: CONTROL COMPONENTS

- |  |                          |                          |                          |
|--|--------------------------|--------------------------|--------------------------|
| 3g. Ensured appropriate system pressure by testing line pressure at both the occupied (day) setting and the unoccupied (night) setting.....                        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3h. Checked that the line dryer prevents moisture buildup.....   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3i. Replaced control system filters at the compressor inlet based on the compressor manufacturer's recommendation (for example, when you blow down the tank) ..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3j. Set the line pressure at each thermostat and damper actuator at the proper level (no leakage or obstructions) .....  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

### ACTIVITY 12: OUTDOOR AIR DAMPERS

- |   |                          |                          |                          |
|---|--------------------------|--------------------------|--------------------------|
| 3k. Ensured that the outdoor air damper is visible for inspection.....  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3l. Ensured that the recirculating relief and/or exhaust dampers are visible for inspection .....                                   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3m. Ensured that air temperature in the indoor area(s) served by each outdoor air damper is within the normal operating range ..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

*NOTE: It is necessary to ensure that the damper is operating properly and within the normal range to continue.*





### 3. CONTROLS FOR OUTDOOR AIR SUPPLY (continued)

- |  | Yes                      | No                       | N/A                      |
|--|--------------------------|--------------------------|--------------------------|
| 3n. Checked that the outdoor air damper fully closes within a few minutes of shutting off appropriate air handler .....  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3o. Checked that the outdoor air damper opens (at least partially with no delay) when the air handler is turned on .....   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3p. If in heating mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 85°F.....   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3q. If in cooling mode, checked that the outdoor air damper goes to its minimum position (without completely closing) when the room thermostat is set to 60°F and mixed air thermostat is set to 45°F..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3r. If the outdoor air damper does not move, confirmed the following items:  |                          |                          |                          |
| • The damper actuator links to the damper shaft, and any linkage set screws or bolts are tight.....  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • Moving parts are free of impediments (e.g., rust, corrosion) .....   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • Electrical wire or pneumatic tubing connects to the damper actuator .....  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| • The outside air thermostat(s) is functioning properly (e.g., in the right location, calibrated correctly).....   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

*Proceed to Activities 13–16 if the damper seems to be operating properly.*

#### ACTIVITY 13: FREEZE STATS

- |   |                          |                          |                          |
|---|--------------------------|--------------------------|--------------------------|
| 3s. Disconnected power to controls (for automatic reset only) to test continuity across terminals.....  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| OR  |                          |                          |                          |
| 3t. Confirmed (if applicable) that depressing the manual reset button (usually red) trips the freeze stat (clicking sound indicates freeze stat was tripped)..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3u. Assessed the feasibility of replacing all manual reset freeze-stats with automatic reset freeze-stats .....   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

*NOTE: HVAC systems with water coils need protection from the cold. The freeze-stat may close the outdoor air damper and disconnect the supply air when tripped. The typical trip range is 35°F to 42°F.*

#### ACTIVITY 14: MIXED AIR THERMOSTATS

- |  |                          |                          |                          |
|--|--------------------------|--------------------------|--------------------------|
| 3v. Ensured that the mixed air stat for heating mode is set no higher than 65°F.....                       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3w. Ensured that the mixed air stat for cooling mode is set no lower than the room thermostat setting..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

#### ACTIVITY 15: ECONOMIZERS

- |  |                          |                          |                          |
|--|--------------------------|--------------------------|--------------------------|
| 3x. Confirmed proper economizer settings based on design specifications or local practices ..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|--|--------------------------|--------------------------|--------------------------|

*NOTE: The dry-bulb is typically set at 65°F or lower.*

- |  |                          |                          |                          |
|--|--------------------------|--------------------------|--------------------------|
| 3y. Checked that sensor on the economizer is shielded from direct sunlight.....  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3z. Ensured that dampers operate properly (for outside air, return air, exhaust/relief air, and recirculated air), per the design specifications ..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

*NOTE: Economizers use varying amounts of cool outdoor air to assist with the cooling load of the room or rooms. There are two types of economizers, dry-bulb and enthalpy. Dry-bulb economizers vary the amount of outdoor air based on outdoor temperature, and enthalpy economizers vary the amount of outdoor air based on outdoor temperature and humidity level.*

### 3. CONTROLS FOR OUTDOOR AIR SUPPLY (continued)

#### ACTIVITY 16: FANS

- 3aa. Ensured that all fans (supply fans and associated return or relief fans) that move outside air indoors continuously operate during occupied hours (even when room thermostat is satisfied) .....  Yes  No  N/A

*NOTE: If fan shuts off when the thermostat is satisfied, adjust control cycle as necessary to ensure sufficient outdoor air supply.*



### 4. AIR DISTRIBUTION

#### ACTIVITY 17: AIR DISTRIBUTION

- 4a. Ensured that supply and return air pathways in the existing ventilation system perform as required.....
- 4b. Ensured that passive gravity relief ventilation systems and transfer grilles between rooms and corridors are functioning .....

*NOTE: If ventilation system is closed or blocked to meet current fire codes, consult with a professional engineer for remedies.*

- 4c. Made sure every occupied space has supply of outdoor air (mechanical system or operable windows) .....
- 4d. Ensured that supply and return vents are open and unblocked .....

*NOTE: If outlets have been blocked intentionally to correct drafts or discomfort, investigate and correct the cause of the discomfort and reopen the vents.*

- 4e. Modified the HVAC system to supply outside air to areas without an outdoor air supply .....
- 4f. Modified existing HVAC systems to incorporate any room or zone layout and population changes.....
- 4g. Moved all barriers (for example, room dividers, large free-standing blackboards or displays, bookshelves) that could block movement of air in the room, especially those blocking air vents .....
- 4h. Ensured that unit ventilators are quiet enough to accommodate classroom activities.....
- 4i. Ensured that classrooms are free of uncomfortable drafts produced by air from supply terminals .....

#### ACTIVITY 18: PRESSURIZATION IN BUILDINGS

*NOTE: To prevent infiltration of outdoor pollutants, the ventilation system is designed to maintain positive pressurization in the building. Therefore, ensure that the system, including any exhaust fans, is operating on the "occupied" cycle when doing this activity.*

- 4j. Ensured that air flows out of the building (using chemical smoke) through windows, doors, or other cracks and holes in exterior wall (for example, floor joints, pipe openings) .....

### 5. EXHAUST SYSTEMS

#### ACTIVITY 19: EXHAUST FAN OPERATION

- 5a. Checked (using chemical smoke) that air flows into exhaust fan grille(s) .....

*If fans are running but air is not flowing toward the exhaust intake, check for the following:*

- Inoperable dampers
- Obstructed, leaky, or disconnected ductwork
- Undersized or improperly installed fan
- Broken fan belt



## 5. EXHAUST SYSTEMS (continued)

### ACTIVITY 20: EXHAUST AIRFLOW

*NOTE: Prevent migration of indoor contaminants from areas such as bathrooms, kitchens, and labs by keeping them under negative pressure (as compared to surrounding spaces).*

- 5b. Checked (using chemical smoke) that air is drawn into the room from adjacent spaces ..... **Yes** **No** **N/A**

*Stand outside the room with the door slightly open while checking airflow high and low in the door opening (see "How to Measure Airflow").*

- 5c. Ensured that air is flowing toward the exhaust intake .....

### ACTIVITY 21: EXHAUST DUCTWORK

- 5d. Checked that the exhaust ductwork downstream of the exhaust fan (which is under positive pressure) is sealed and in good condition.....

## 6. QUANTITY OF OUTDOOR AIR

### ACTIVITY 22: OUTDOOR AIR MEASUREMENTS AND CALCULATIONS

*NOTE: Refer to "How to Measure Airflow" for techniques.*

- 6a. Measured the quantity of outdoor air supplied (22a) to each ventilation unit .....
- 6b. Calculated the number of occupants served (22b) by the ventilation unit under consideration .....
- 6c. Divided outdoor air supply (22a) by the number of occupants (22b) to determine the existing quantity of outdoor air supply per person (22c).....

### ACTIVITY 23: ACCEPTABLE LEVELS OF OUTDOOR AIR QUANTITIES

- 6d. Compared the existing outdoor air per person (22c) to the recommended levels in Table 1 .....
- 6e. Corrected problems with ventilation units that supplied inadequate quantities of outdoor air to ensure that outdoor air quantities (22c) meet the recommended levels in Table 1 .....

---

## NOTES



# Background Information for Ventilation Checklist

The Ventilation Checklist offers in-depth guidance to schools for inspecting ventilation systems. Typical schools have multiple ventilation units and central HVAC systems. Perform the activities and complete a checklist for each unit and system.

**The following process is recommended for completing the checklist:**

## Activities 1–3

Perform these activities for all outdoor air intakes while outside the building; mark the results on the Ventilation Checklist for each unit.

## Activities 4–12

Perform these activities as a set on each ventilation unit or air handling unit while you're in the appropriate room with the unit turned on.

## Activities 13–16

Perform these ventilation control system activities as necessary.

## Activities 17–21

Perform these air distribution activities as necessary.

## Activities 22–23

Perform these activities regarding the quantity of outdoor air on all units while you have the airflow measurement equipment available.

For more detailed information see *IAQ Building Education and Assessment Model* (EPA 402-C-01-001), listed in **Appendix L: “Resources”** in the *IAQ Reference Guide*.

There are two primary types of ventilation systems in schools:

- Mechanical systems—unit ventilators, central HVAC (e.g., air cooled packaged rooftop HVAC unit, chilled water air-handling unit), and central exhaust.
- Passive ventilation—operable windows, air leaks, wind, and the stack effect (the tendency of warm air to rise).

Most checklist activities apply to mechanical systems and are designed to ensure that the ventilation system is clean and that outdoor air is adequately supplied to the appropriate areas. The checklist is designed for individuals who are properly trained in mechanical systems and safety procedures. Basic tools are required for most activities (see **Appendix B: “Basic Measurement Equipment”** in the *IAQ Reference Guide*). Skip checklist items that do not apply to your system. (See diagram of a Typical HVAC System on reverse side of this sheet.)

## OUTDOOR AIR INTAKES

Blocked or clogged outdoor air intakes can result in reduced amounts of outdoor air, which can lead to stuffy air and health problems from exposure to accumulated pollutants. Proper location of outdoor air intakes can minimize the entrance of contaminated air. Problems due to pollutants near intakes may be resolved by:

- Removing the source (such as relocating a dumpster).
- Separating the source from the intake (such as extending a pipe to raise a nearby exhaust outlet above the intake).
- Changing operating procedures (such as not allowing buses and delivery trucks to idle).

## SYSTEM CLEANLINESS

Accumulated dirt can interfere with the proper operation of the ventilation system and lead to:

- Insufficient ventilation.
- Uncomfortable room temperatures.
- Lowered efficiency (and higher utility bills).
- Additional maintenance.
- Rapid deterioration of equipment.

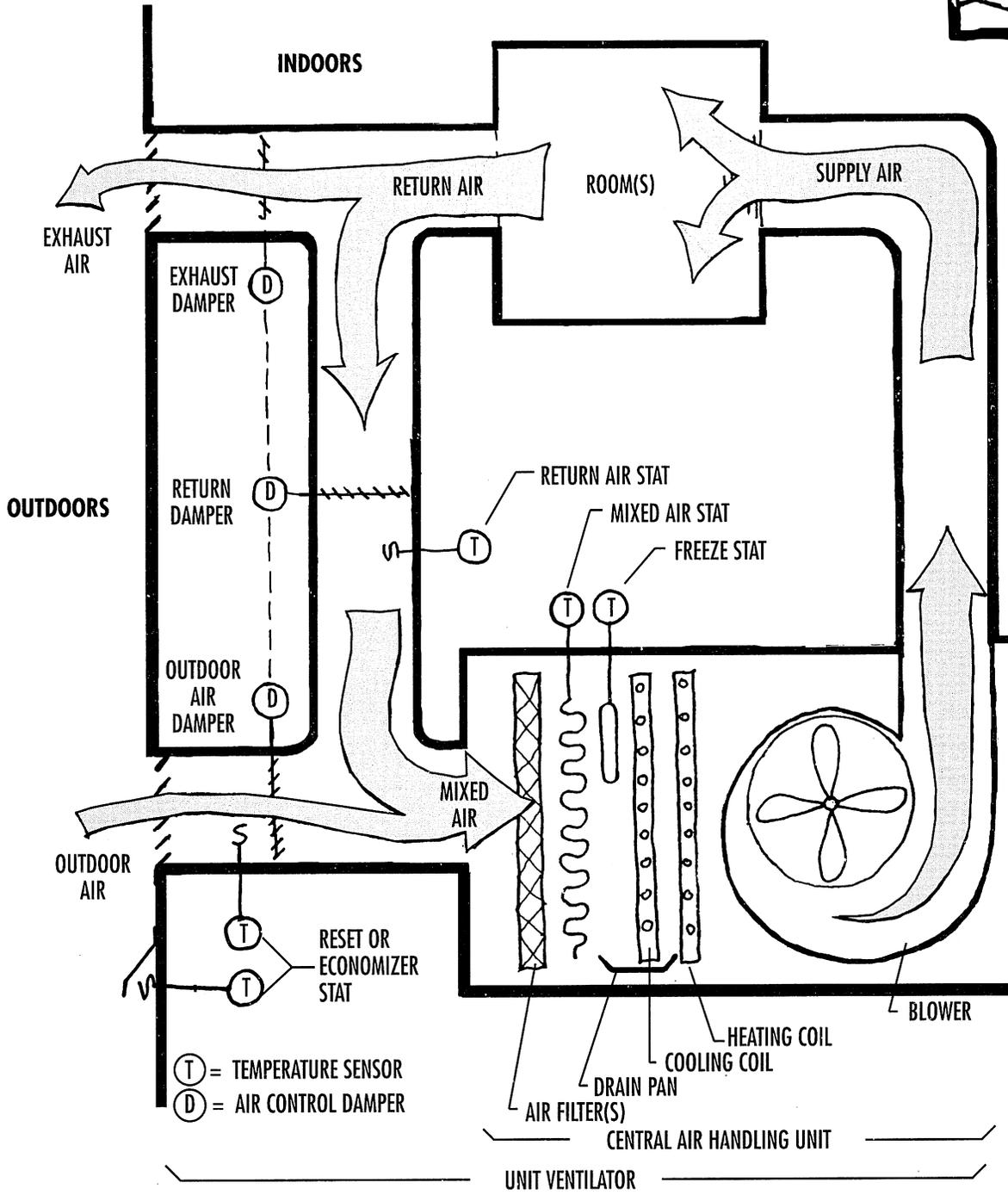
### Primary Topic Areas

- Outdoor Air Intakes
- System Cleanliness
- Controls for Outdoor Air Supply
- Air Distribution
- Exhaust Systems
- Quantity of Outdoor Air
- How to Measure Air Flow

### Instructions

Read this section before completing the Ventilation Checklist.

# Typical HVAC System





Air filters must be properly selected and regularly replaced to prevent dirt and dust from accumulating in the HVAC system. Dirty filters restrict airflow. Filter “blow outs” allow dirt in unfiltered air to accumulate on coils, producing a need for more frequent cleaning and reducing the efficiency of the heating and/or cooling plant. It is much less expensive to trap dirt with properly maintained filters than to clean ductwork, coils, fan blades, and other HVAC system components.

*WARNING: Do not clean dirty or biologically contaminated system components when the system is operating or when the building is occupied.*

*WARNING: If there is visible biological growth (such as mold), obtain expert advice about the kind of respiratory protection to use and how to use it.*

## CONTROLS FOR OUTDOOR AIR SUPPLY

This group of activities is for ventilation systems that use fans or blowers to supply outdoor air to one or more rooms within a school.

Since your **ventilation controls** may be unique, and since there are many different types and brands of control components, you will find it helpful to review controls specifications, as-built mechanical drawings, and controls operations manuals.

Based on your equipment and experience, perform as many of the activities and make as many indicated repairs as possible. Discuss the need for additional help for incomplete activities or repairs with your IAQ Coordinator.

*NOTE: If the amount of outdoor air supply measured in Activity 22 of the checklist proves to be inadequate for the number of occupants served, you may have to slightly adjust the minimum outdoor damper setting. Use a nut or a knob to adjust for a larger damper opening. If a larger adjustment on an outdoor air supply is required, contact the HVAC system installer or HVAC maintenance contractor.*

## AIR DISTRIBUTION

Even when sufficient outdoor air enters the school building, under-ventilation can occur in particular areas of the building if the outdoor air is not properly distributed. Problems with air distribution are most likely to occur if:

- Ventilation equipment malfunctions.
- Ventilation intakes are located too close to ventilation exhausts.
- Room layouts are altered without adjusting the HVAC system.
- The population of a room or zone increases without adjusting the HVAC system.

**Unit Ventilators** are sometimes specified to operate under one of the following American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE) sequences:

**Cycle I:** Except during warm-up stage (outdoor air damper closed), Cycle I supplies 100 percent outdoor air at all times.

**Cycle II:** During the heating stage, Cycle II supplies a set minimum quantity of outdoor air. For cooling, outdoor air is gradually increased as required. During warm-up, the outdoor air damper is closed. (Typical sequence for northern climates.)

**Cycle III:** During the heating, ventilating, and cooling stages, Cycle III supplies a variable amount of outdoor air as required to maintain a fixed temperature (typically 55°F) entering the heating coil. When heat is not required, this air is used for cooling. During warmup, the outdoor air damper is closed. (Typical sequence for southern climates, with adaptations for mechanical cooling.)

- Differences in air pressure move contaminants from outdoors to indoors then transport them within buildings, or from bathrooms to hallways and classrooms.

In schools with mechanical ventilation equipment, fans are the dominant influence on pressure differences and airflow. In schools without mechanical ventilation equipment, natural forces (wind and stack effect) are the primary influences on airflow.

Air moves from areas of high pressure to areas of low pressure. To prevent infiltration of outdoor air and soil gas (for example, radon), mechanically ventilated buildings often maintain a higher air pressure indoors than outdoors. This is known as **positive pressurization**. At the same time, exhaust fans control indoor contaminants by keeping some rooms—smoking lounges, bathrooms, kitchens, and laboratories—under negative pressure compared to neighboring spaces (for example, another room, a corridor, or the outdoors). **Negative pressurization** of buildings may cause problems with natural draft combustion appliances or cause outdoor pollutants, such as pollens or vehicle exhaust in loading docks, to be drawn into the building through openings and cracks in the construction.

To determine whether a room is positively or negatively pressurized—or neutral—release puffs of smoke near the top and bottom of a slightly opened door or window. Observe the direction of flow. If the smoke flows inward at both the top and bottom of a slightly opened door, for example, the room is negatively pressurized when compared to the space on the other side of the door.

## EXHAUST SYSTEMS

Exhaust systems remove contaminated air and odors. Some HVAC designs also rely on the operation of exhaust fans to create negative pressure that draws outdoor air into the building through windows and gaps in the building envelope. If insufficient air flows toward the exhaust intake when the fan is running, check the following:

- The backdraft damper at the exhaust outlet may be stuck open.
- Obstructions may be clogging the ductwork.
- The ductwork could have leaks or be disconnected.
- The fan belt may be broken.
- The motor may be installed backwards.
- The fan may supply insufficient quantities of air for room capacity (i.e., improper design).

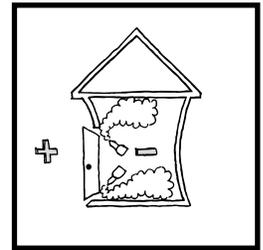
## QUANTITY OF OUTDOOR AIR

To maintain good indoor air quality, you must ensure that acceptable quantities of outdoor air enter the building. ASHRAE’s ventilation recommendations are located in Table 1:

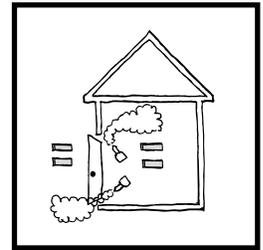
1. In the first column of Table 1, find the listing for the type of area served by the unit you are evaluating.
2. Check the second column to see if the occupancy for each 1,000 square feet that the ventilation unit serves is no greater than the occupancy assumed for the recommendations.
3. Compare the recommended ventilation in the third column of Table 1 to the calculated outdoor air per person from Activity 22 of the Ventilation Checklist.
4. If the calculated airflow falls below the recommendations in Table 1, the school may have been designed to meet a lower standard that was in effect when the school was built. If you have design specifications for the system or know code requirements in effect at the time of construction, compare the measured outdoor air to this specification. Repair the system to meet the design specification, if necessary.



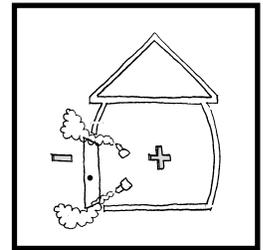
### Negative Pressure



### Neutral Pressure



### Positive Pressure





**Table 1: Selected ASHRAE Ventilation Recommendations**

Type of Area	Occupancy (people/1000 ft <sup>2</sup> )	Cubic feet per minute (CFM)/person
--------------	---	---------------------------------------

**Instructional Areas**

Classrooms	50	15
Laboratories	30	20
Music rooms	50	15
Training shops	30	20

**Staff Areas**

Conference rooms	50	20
Offices	7	20
Smoking lounges	70	60

Bus garage: 1.5 CFM per square foot of floor area.  
 Distribution among people must consider worker location and concentration of running engines; stands where engines are run must incorporate systems for positive engine exhaust withdrawal. Contaminant sensors may be used to control ventilation.

**Assembly Rooms**

Auditoriums	150	15
Libraries	20	15
Gymnasiums		
<i>Spectator areas</i>	150	15
<i>Playing floor</i>	30	20

**Food and Beverage Service**

Cafeteria	100	20
Kitchen	20	15

Additional airflow may be needed to provide make-up air for hood exhaust(s). The sum of the outdoor air and transfer air of acceptable quantity from adjacent spaces shall be sufficient to provide an exhaust rate of not less than 1.5 CFM/square foot.

**Miscellaneous**

Nurse's offices (patient areas)	10	25
Corridors:	0.1 CFM/square foot	
Locker rooms:	0.5 CFM/square foot	
Restroom:	50 CFM/urinal or water closet	

*SOURCE:* ASHRAE Standard 62-2001, Ventilation for Acceptable Air Quality

If the school's design meets a lower standard and cannot meet the current recommended levels in Table 1, discuss means for increasing ventilation with the IAQ Coordinator. These could include:

- Retrofitting the ventilation system for increased capacity.
- Opening windows. **CAUTION: Consider potential ventilation problems that this may cause in other parts of the building.**
- Making any permanent repairs and taking any other measures that help ensure adequate outdoor air in the future. These improvements will probably require the services of a professional engineer.

## HOW TO MEASURE AIRFLOW

There are three activities for evaluating air movement and measuring outdoor air supply:

- Determine airflow direction using chemical smoke.
- Measure quantity of outdoor air supply.
- Take carbon dioxide measurements to estimate outdoor air supply.

### 1. Determine Airflow Direction Using Chemical Smoke

Chemical smoke can be helpful in tracking air and pollutant movement and identifying pressure differentials.

Chemical smoke maintains the temperature of the surrounding air and is extremely sensitive to air currents. This allows for observation of airflow patterns, particularly direction and speed of air movement.

- Release smoke near outdoor air intakes to determine whether air is being drawn in.
- Release puffs of smoke at the shell of the building (by doors, windows, or gaps) to determine whether the HVAC systems are maintaining interior spaces under positive pressure relative to the outdoors.

- Release puffs of smoke near HVAC vents to evaluate supply and return and whether ventilation air actually reaches the breathing zone.
  - For a variable air volume system, consider how the system modulates. It could be on during the test but off for much of the rest of the day.
  - “Short-circuiting” occurs when air moves directly from supply diffusers to return grilles instead of mixing with room air in the breathing zone. In this situation, occupants may not receive adequate outdoor air.

Chemical smoke comes with various dispensing mechanisms, including smoke “bottles,” “guns,” “pencils,” or “tubes.” These dispensers allow smoke to be released in controlled quantities and directed at specific locations. It is often more informative to use a number of small puffs of smoke as you move along an air pathway rather than releasing a large amount in a single puff.

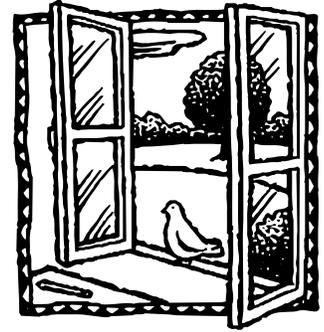
*CAUTION: Chemical smoke devices use titanium tetra-chloride to produce smoke. While the chemicals forming the smoke are not considered hazardous in the small quantities produced during testing, avoid inhaling smoke; concentrated fumes from smoke devices are very corrosive.*

### 2. Measure Outdoor Air Supply Quantity

Flow hoods or air velocity measurement devices can be used to determine the amount of outdoor air supplied by a single ventilation unit. General instructions for measuring airflow are provided below. Follow the instructions provided by the manufacturer of your measuring equipment if they differ.

#### Step A: Determine airflow quantity

Flow hoods measure airflow at a diffuser or grille in cubic feet per minute (CFM). Other devices, such as a Pitot tube or





anemometer, are used to measure air velocity and calculate the quantity of outdoor air supply. Follow the instructions supplied with the equipment regarding use, care, and calibration. (See the IAQ Coordinator for help obtaining these devices.)

To determine airflow quantity for a mechanical system:

- Measure air velocity in large ductwork using a Pitot tube with a differential pressure gauge or an anemometer. Calculate the outdoor airflow in CFM at the outdoor air intake of the air-handling unit or other convenient location. For more information on measuring air velocity and calculating outdoor air supply, see the instructions supplied with the Pitot tube or anemometer.

**OR**

- If you are using a flow hood, simply hold the hood up to the diffuser and read the airflow value.
- Enter the calculated outdoor air supply in the Ventilation Checklist.

If your system does not have mechanically-supplied outdoor air (i.e., if it is a passive system), you can estimate the amount of outdoor air infiltrating the area by measuring the quantity of air exhausted by fans serving the area:

- Use a small floor plan, such as a fire escape map, to mark the areas served by each exhaust fan.
- Measure airflow at grilles or exhaust outlets using a flow hood. Determine the airflow in ductwork, if present, by using a Pitot tube with a differential pressure gauge or an anemometer.
- Add the airflows (in CFM) from all exhaust fans serving the area you are measuring and enter the measurement in the Ventilation Checklist.

**Step B: Determine the occupied zones**

Count the number of students and staff located in each area served by an air-handling unit to determine the “occupied zone.” A unit ventilator’s occupied zone is likely an individual classroom. In areas served by large air-handling units, an occupied zone may include several rooms. In some cases (such as a gymnasium), several air-handling units may serve a single room.

- Use a small floor plan to mark the occupied zone served by each unit.
- Estimate the number of occupants in each zone.

**Step C: Calculate Outdoor Air Per Person**

Use the equation below to calculate average ventilation rates in CFM/person.

$\frac{\text{Outdoor Air (CFM)}}{\text{Number of Occupants}} = \text{Outdoor Air (average CFM/person)}$
---

**3. Estimate Quantity of Outdoor Air Supply Using Carbon Dioxide Measurements**

Indoor carbon dioxide (CO<sub>2</sub>) concentrations can be used to estimate outdoor air ventilation. Exhaled breath of building occupants and other sources can raise CO<sub>2</sub> levels indoors above levels outdoors. Measure CO<sub>2</sub> with a direct-reading meter (following manufacturer’s instructions) and compare peak CO<sub>2</sub> readings between rooms and between air-handler zones to identify and diagnose various building ventilation deficiencies.

**Step A: Measure CO<sub>2</sub> levels**

Measure CO<sub>2</sub> levels in each area served by a specific unit or exhaust fan(s) and in an area without any mechanical ventilation. The number of occupants, time of day, position of windows and doors, and weather should be noted for each period of CO<sub>2</sub> testing.

- Take several CO<sub>2</sub> measurements with minimal delays between readings in the area under consideration. Avoid measurements near any source that could directly influence the reading (for example, hold the sampling device away from exhaled breath).
- Compare measurements taken at different times of day. Classroom CO<sub>2</sub> levels typically increase during the morning, fall during the lunch period, then peak in mid-afternoon. Therefore, measure CO<sub>2</sub> levels in the mid- to late-afternoon (when concentrations are expected to peak).
- Take several measurements outdoors.
- For systems with mechanically-supplied outdoor air, take one or more readings:
  - At the supply air vent.
  - In the mixed air (if measured at an air handler).
  - In the return air.

### Step B: Estimate Quantity Outdoor Air Supply

- Calculate the percentage of outdoor air in supply air using CO<sub>2</sub> measurements taken in Step A:

$$\text{Outdoor air (\%)} = (\text{CR}-\text{CS}) \div (\text{CR}-\text{CO}) \times 100$$

CS = ppm of CO<sub>2</sub> in the supply air (room measurement) or in the mixed air (air-handler measurement)

CR = ppm of CO<sub>2</sub> in the return air

CO = ppm of CO<sub>2</sub> in the outdoor air (typical range is 300-450 ppm)

- Convert outdoor air percentage to an amount of outdoor air in cubic feet per minute:

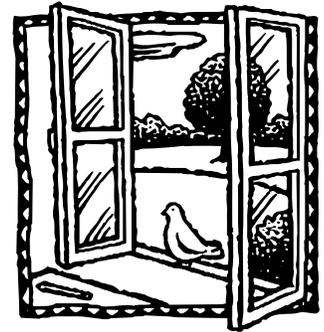
$$\text{Outdoor air (CFM)} = \text{Outdoor air (\%)} \div 100 \times \text{total airflow (CFM)}$$

Total airflow may be the air quantity supplied to a room or zone, the capacity of an air handler, or the total airflow of the HVAC system. The actual amount of airflow in an air handler, however, is often different from the quantity in design documents. Therefore, only measured airflow is accurate.

### Step C: Note high CO<sub>2</sub> levels

Based on CO<sub>2</sub> measurements from Step A, note areas with CO<sub>2</sub> concentrations more than 700 ppm above the outdoor air concentration. Elevated CO<sub>2</sub> indicates an insufficient supply of outdoor air for the number of people in the space. (See Table 1 in this section, **Appendix C**, and *Ventilation for Acceptable Indoor Air Quality* (ASHRAE Standard 62-2001) in **Appendix L**: “Resources” in the *IAQ Reference Guide*.)

A primary source of CO<sub>2</sub> indoors is human respiration (exhaled breath). As people move in and out of a room, CO<sub>2</sub> levels can change rapidly. Note that problems with low ventilation rates may still occur in rooms with peak CO<sub>2</sub> concentrations less than 700ppm above the outdoor air concentration. Frequently, 4 to 6 hours of continuous occupancy are required for CO<sub>2</sub> to approach peak levels.





# Walkthrough Inspection Checklist

Name: \_\_\_\_\_

School: \_\_\_\_\_

Room or Area: \_\_\_\_\_ Date Completed: \_\_\_\_\_

Signature: \_\_\_\_\_

**Instructions**

1. Read the *IAQ Backgrounder* and the Background Information for this checklist.
2. Keep the Background Information and make a copy of the checklist for future reference.
3. Complete the Checklist.
  - Check the “yes,” “no,” or “not applicable” box beside each item. (A “no” response requires further attention.)
  - Make comments in the “Notes” section as necessary.
4. Return the checklist portion of this document to the IAQ Coordinator.

## 1. GROUND LEVEL

	Yes	No	N/A
1a. Ensured that offices are dusted and vacuumed regularly .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1a. Ensured that ventilation units operate properly .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1b. Ensured there are no obstructions blocking air intakes.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1c. Checked for nests and droppings near outdoor air intakes.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1d. Determined that dumpsters are located away from doors, windows, and outdoor air intakes .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1e. Checked potential sources of air contaminants near the building (chimneys, stacks, industrial plants, exhaust from nearby buildings) .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1f. Ensured that vehicles avoid idling near outdoor air intakes.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1g. Minimized pesticide application .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1h. Ensured that there is proper drainage away from the building (including roof downspouts) .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1i. Ensured that sprinklers spray away from the building and outdoor air intakes.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1j. Ensured that walk-off mats are used at exterior entrances and that they are cleaned regularly .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## 2. ROOF

*While on the roof, consider inspecting the HVAC units (use the Ventilation Checklist).*

2a. Ensured that the roof is in good condition .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2b. Checked for evidence of water ponding .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2c. Checked that ventilation units operate properly (air flows in).....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2d. Ensured that exhaust fans operate properly (air flows out).....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2e. Ensured that air intakes remain open, even at minimum setting.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2f. Checked for nests and droppings near outdoor air intakes.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2g. Ensured that air from plumbing stacks and exhaust outlets flows away from outdoor air intakes.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## 3. ATTIC

3a. Checked for evidence of roof and plumbing leaks.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3b. Checked for birds and animal nests .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## 4. GENERAL CONSIDERATIONS

4a. Ensured that temperature and humidity are maintained within acceptable ranges .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4b. Ensured that no obstructions exist in supply and exhaust vents .....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**4. GENERAL CONSIDERATIONS (continued)**

- |  | Yes                      | No                       | N/A                      |
|--|--------------------------|--------------------------|--------------------------|
| 4c. Checked for odors .....                                      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4d. Checked for signs of mold and mildew growth .....            | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4e. Checked for signs of water damage .....                      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4f. Checked for evidence of pests and obvious food sources ..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4g. Noted and reviewed all concerns from school occupants .....  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |



**5. BATHROOMS AND GENERAL PLUMBING**

- |  |                          |                          |                          |
|--|--------------------------|--------------------------|--------------------------|
| 5a. Ensured that bathrooms and restrooms have operating exhaust fans.....      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5b. Ensured proper drain trap maintenance:                                     |                          |                          |                          |
| Water is poured down floor drains once per week (approx. 1 quart of water).... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Water is poured into sinks at least once per week (about 2 cups of water)..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Toilets are flushed at least once per week.....                                | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

**6. MAINTENANCE SUPPLIES**

- |  |                          |                          |                          |
|--|--------------------------|--------------------------|--------------------------|
| 6a. Ensured that chemicals are used only with adequate ventilation and when building is unoccupied .....   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6b. Ensured that vents in chemical and trash storage areas are operating properly.....   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6c. Ensured that portable fuel containers are properly closed .....  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6d. Ensured that power equipment, like snowblowers and lawn mowers, have been serviced and maintained according to manufacturers' guidelines ..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

**7. COMBUSTION APPLIANCES**

- |  |                          |                          |                          |
|--|--------------------------|--------------------------|--------------------------|
| 7a. Checked for combustion gas and fuel odors .....                        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7b. Ensured that combustion appliances have flues or exhaust hoods.....    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7c. Checked for leaks, disconnections, and deterioration .....             | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7d. Ensured there is no soot on inside or outside of flue components ..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

**8. OTHER**

- |   |                          |                          |                          |
|---|--------------------------|--------------------------|--------------------------|
| 8a. Checked for peeling and flaking paint (if the building was built before 1980, this could be a lead hazard)..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8b. Determined date of last radon test .....  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

---

**NOTES**



## Instructions

Read this section before completing the Walkthrough Inspection Checklist.

# Background Information for Walkthrough Inspection Checklist

A school walkthrough by the Indoor Air Quality (IAQ) Team is an integral part of IAQ management. It is an eye-opening educational experience for anyone interested in the environmental health of the building. The walkthrough should not be an intensive, detailed, or costly inspection. Instead, it is a quick overview of the conditions that can affect the school's IAQ. While some schools wait until the initial parts of the *IAQ TJS* Program have been completed, others have had success “jump-starting” their program by beginning with a quick walkthrough. Request the participation of someone who is familiar with the operation of the building, such as a facility operator or custodian.

During the walkthrough, use your senses:

**Look** at the general level of cleanliness in classrooms and mechanical rooms. Watch for potential pollutant sources including mold, improperly stored chemicals, or excessively dirty air filters and ducts. Look for signs of water damage, which may point to an underlying problem. Water damage increases the chance of biological contamination. Look for books or papers on top of unit ventilators or plywood covering outdoor air intakes.

**Smell** for unique or objectionable odors—including mold, mildew, and “chemical” smells—as you move from room to room. Note any potential sources of these odors.

**Feel** for uncomfortable air temperatures, drafts, and high or low humidity. Check for air flowing into and out of grilles and air vents.

**Listen** to the concerns of school occupants regarding IAQ. Do they experience any IAQ-related symptoms in classrooms? Do they store and use their own sprays to control pests? Do they turn off the unit ventilator during class because it is too noisy? Listen for unusual equipment noises that may indicate potential problems.

A complete walkthrough inspection incorporates the entire school, including specialty areas such as cafeterias, art rooms, and industrial arts areas.

## EXTERIOR INSPECTION

Begin the walkthrough inspection outside. Look for anything that might impact the air indoors. Considerations include ventilation inlets, outdoor sources of pollution (e.g., dumpsters, vehicle exhaust, pesticides), site drainage, holes in the building shell, the condition of the roof, and evidence of pests. Use the checklist as a guide and note any relevant observations on it or on a plan of the school.

### Vehicles on School Grounds

Vehicles on school grounds can expose students and staff to exhaust emissions. Identify areas where vehicles (buses, delivery trucks) may idle and ensure that they are far away from school air intakes. Determine the transportation needs and usage at your school—how students and staff get to school, the number of cars, buses, walkers, and bicycles, etc. Assess if buses and/or cars tend to idle in areas where students congregate (near playgrounds or in front of the school building). Many problems can be eliminated simply by not allowing vehicles to idle and by relocating delivery and pick-up areas.

## INTERIOR INSPECTION

Continue the walkthrough inspection inside. Look for noticeable temperature and humidity concerns; indications that the ventilation system is functioning; general cleanliness; evidence of pollutant sources, including mold and mildew; and anything else that might impact the air indoors. Use the checklist as a guide and note any relevant observations on it or on a floor plan of the school.





# Indoor Air Quality Concern Form

Building Name: \_\_\_\_\_ Work Order Number: \_\_\_\_\_

Address: \_\_\_\_\_

Occupant Name: \_\_\_\_\_ Work Location: \_\_\_\_\_

Completed by: \_\_\_\_\_ Title: \_\_\_\_\_ Date: \_\_\_\_\_

## SYMPTOM PATTERNS

What kind of symptoms or discomfort are you experiencing? \_\_\_\_\_

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Are you aware of other people with similar symptoms or concerns? Yes \_\_\_\_\_ No \_\_\_\_\_

If so, what are their names and locations? \_\_\_\_\_

---

## TIMING PATTERNS

When did your symptoms start? \_\_\_\_\_

---

When are they generally worst? \_\_\_\_\_

---

Do they go away? If so, when? \_\_\_\_\_

---

Have you noticed any other events (such as weather events, temperature or humidity changes, or activities in the building) that tend to occur around the same time as your symptoms? \_\_\_\_\_

---

---

## SPATIAL PATTERNS

Where are you when you experience symptoms or discomfort? \_\_\_\_\_

---

Where do you spend most of your time in the building? \_\_\_\_\_

---

**ADDITIONAL INFORMATION**

Do you have any observations about building conditions that might need attention or might help explain your symptoms (e.g., temperature, humidity, drafts, stagnant air, odors)? \_\_\_\_\_

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Have you sought medical attention for your symptoms? \_\_\_\_\_

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Do you have any other comments? \_\_\_\_\_

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OFFICE USE ONLY

