*Indoor Air Quality (IAQ) Tools for Schools:* Preventive Maintenance Guidance
Appendix B: IAQ Preventive Maintenance Model Plan

Model Plan[[1]](#footnote-1)

IAQ Preventive Maintenance Plan

[School District Name]

[Date]

[Italicized sections in this Model Plan could be completed according to the instructions or simply deleted. The footer could be replaced with your school or district name, name of plan, and the date or version of the plan.]

[This could be a standalone IAQ Preventive Maintenance Plan, or you could add elements of this plan to your IAQ Management Plan[[2]](#footnote-2),[[3]](#footnote-3) or your Preventive Maintenance Plan.]

**Table of Contents**

1. [Mission and Goals](#_Mission_and_Goals)
2. [Checklists, Procedures and Schedules](#_Checklists_and_Schedules)
3. [Walkthroughs and Assessment](#_Walkthrough_and_Assessment)
4. [Team and Staffing](#_Team_Staffing)
5. [Communication and Training](#_Communication_and_Training)
6. [Evaluation](#_Evaluation)

# Mission and Goals[[4]](#footnote-4),[[5]](#footnote-5)

The health, comfort and learning environment of students and staff all are important aspects of [*School District*]’s mission. We developed an indoor air quality (IAQ) preventive maintenance plan that will help protect the quality of air in our school buildings and ensure that equipment and facilities perform reliably, promoting equipment longevity and reducing unexpected, costly repairs. The objectives of this IAQ Preventive Maintenance Plan are as follow:

* Reduce the levels of indoor air pollutants through preventive measures, such as routine maintenance activities, periodic building evaluations and inspections, and IAQ-specific policies.
* Provide and maintain adequate airflow by repairing and maintaining ventilation equipment, which will promote a comfortable and healthy learning environment.

Respond to IAQ-related concerns and problems in a prompt and thorough manner, and effectively communicate the progress of investigations and their resolution to all interested parties.

*[In addition to the mission and objectives, you can create a bold goal, define other specific goals and estimate your return on investment using the* [*IAQ Preventive Maintenance Value Proposition Worksheet*](https://www.epa.gov/iaq-schools/indoor-air-quality-preventive-maintenance-value-proposition-worksheet?utm_content=&utm_medium=email&utm_name=&utm_source=govdelivery&utm_term=)*.]*

*[Bold Goal Example to be tailored for your school district.]* The bold goal my program focuses on is creating healthy learning environments for our students, protecting the health of custodial staff and increasing the lifespan of the facilities by implementing preventive maintenance best practices as part of a comprehensive IAQ management program.

In addition, implementing preventive maintenance practices keeps our facilities in good working order and helps extend the life of our equipment and assets, which will save money in the long run. By developing a preventive maintenance plan and implementing it, this program will save [*$500,000*] in reactive/emergency maintenance costs for [*Area School District within the first 2 years*].

# Checklists and Schedules

IAQ preventive maintenance means the routine inspection, cleaning, adjustment and repair of building structures and systems, such as the heating, ventilating and air-conditioning system (HVAC); local exhaust ventilation; flooring; and other infrastructure. IAQ preventive maintenance plays a major role in maintaining the quality of air by ensuring that the building systems are operating effectively and efficiently. Moreover, it helps to maintain a comfortable temperature and humidity in occupied spaces.

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 ASHRAE Standards 55[[6]](#footnote-6) and 62.[[7]](#footnote-7) If those parameters cannot be met, school staff make ventilation adjustments that provide fresh air delivery and temperature and humidity levels that are as close as possible to the current ASHRAE Standard.

## Inventory

[Once you have developed an equipment and building systems inventory, refer to it here. To get started, refer to [Develop Your Plan](https://www.epa.gov/iaq-schools/indoor-air-quality-tools-schools-preventive-maintenance-guidance#develop) in the IAQ Tools for Schools: Preventive Maintenance Guidance. You also can refer to [Appendix D: IAQ Preventive Maintenance Sample Equipment Inventory](https://www.epa.gov/iaq-schools/indoor-air-quality-tools-schools-preventive-maintenance-guidance#appendices) in the guidance for a complete list of equipment to consider in your inventory.]

## Checklists and Schedules

[Once you have developed an IAQ Preventive Maintenance Checklist, refer to it here.]

[If you are developing your IAQ Preventive Maintenance Checklist from scratch, refer to [Develop Your Plan](https://www.epa.gov/iaq-schools/indoor-air-quality-tools-schools-preventive-maintenance-guidance#develop) in the IAQ Tools for Schools: Preventive Maintenance Guidance to get started. If you have an existing IAQ management plan and/or preventive maintenance plan, you can cross-check your plan(s) with the resources listed in the Develop Your Plan section and with the U.S. Environmental Protection Agency’s (EPA) [IAQ Preventive Maintenance Checklist](https://www.epa.gov/iaq-schools/indoor-air-quality-tools-schools-preventive-maintenance-guidance#appendices) to ensure that your IAQ preventive maintenance plan is comprehensive.]

[*School District*]’s preventive maintenance schedules for each building are located in [*location*] and include the building and ventilation components that are inspected and maintained on a routine basis. [*See Attachment 1 for an example schedule, which needs to be tailored or each specific building*]. The schedules were established using past experiences with maintenance professionals; the availability of resources; and technical guides, including the equipment manufacturers’ specifications. The person performing the preventive maintenance follows the checklist strictly, and the [*IAQ Preventive Maintenance Coordinator or appropriate staff person*] monitors its completion. All records of completed preventive maintenance are [*kept in the IAQ Preventive Maintenance Plan, stored in the building engineer’s filing cabinet, attached to the operating system, etc.*].

# Walkthroughs and Assessment

## Walkthrough Inspections

An IAQ preventive maintenance walkthrough inspection of the functional spaces in all the buildings that house administrative or educational operations is conducted annually. The purpose of the walkthrough inspection is to identify new problems, further evaluate problems identified previously and confirm what repairs and other changes have been made. The inspection is a quick overview of each building, and a more detailed evaluation is conducted through the building systems assessments (see below).

The walkthrough inspections provide some insight regarding the type, location and magnitude of apparent IAQ-related issues and problems.

The walkthrough inspectors assess IAQ using sight, smell, touch and hearing. The inspections check the occupied spaces (classrooms, hallways, offices, kitchens) and other IAQ “functional” areas (exterior, roof, mechanical rooms, bathrooms, storage rooms, boiler). The walkthrough also 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 Asbestos Hazard Emergency Response Act (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 operations and maintenance programs (e.g., ventilation, carpet, building compounds)

Copies of the walkthrough checklists are kept [*with the IAQ Preventive Maintenance Plan in Appendix X*].

## Building Assessments

School buildings are evaluated every year, including 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 and exhaust. The maintenance evaluation checks building supplies, dust control, floor cleaning, drain traps, moisture control and combustion appliances.

The IAQ in [*School District*] buildings is 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 [*staff member or district environmental consultant*] evaluate building systems ensures that an individual with IAQ management expertise examines all areas of the buildings every year.

The [*IAQ Preventive Maintenance Coordinator or point person*] uses the IAQ Preventive Maintenance Checklist. In addition, the *IAQ Tools for Schools* [walkthrough](https://www.epa.gov/iaq-schools/walk-through-inspection-checklist-indoor-air-quality-tools-schools), [ventilation](https://www.epa.gov/iaq-schools/ventilation-checklist-indoor-air-quality-tools-schools) and [maintenance](https://www.epa.gov/iaq-schools/building-and-grounds-maintenance-checklist-indoor-air-quality-tools-schools) checklists could be used to assess overarching IAQ management activities. The [*IAQ Preventive Maintenance Coordinator or point person*] reviews the findings from the walkthroughs and drafts ideas to address them. If the causes of problems cannot be identified, a different evaluation method may be used. Records of yearly building assessments are kept in [*Facility Services office*].

# Team and Staffing

[*School District*] has established an IAQ Preventive Maintenance Team that represents [*facilities director, energy manager, custodial director, other key staff, service providers*]. The following chart helps all team members understand their roles and responsibilities.

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Job Title | Contact Information | Team Role/Responsibilities |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

The IAQ Preventive Maintenance Team is involved in the following efforts:

1. The IAQ Preventive Maintenance Team contributes to the IAQ Preventive Maintenance Plan creation and implementation. The team members have reviewed EPA’s *IAQ Tools for Schools:* Preventive Maintenance Guidance and the *IAQ Tools for Schools* Action Kit, focusing on backgrounders and checklists relevant to each team members’ expertise.
2. The IAQ Preventive Maintenance Team evaluates nonroutine IAQ preventive maintenance concerns that have been reported to the [*IAQ Preventive Maintenance Coordinator or point person*]. The team takes steps or recommends measures to resolve the reported concern.
3. The IAQ Preventive Maintenance Team meets regularly [*monthly, quarterly, biannually, as part of regularly scheduled health and safety meetings, or other time frame*] to review ongoing IAQ issues and projects.
4. The IAQ Preventive Maintenance Team meets [*annually or as needed; indicate frequency*] to conduct an annual review the IAQ Preventive Maintenance Plan.
5. The IAQ Preventive Maintenance Team meeting minutes, reports and other documents are kept with the IAQ Preventive Maintenance Plan in [*note location of files*].

# Communication and Training

## Communication

Communication is a critical element to successfully managing IAQ. The [*IAQ Preventive Maintenance Coordinator or point person*] and other district authorities try to communicate effectively to limit misinformation and confusion. The [*IAQ Preventive Maintenance Coordinator or point person*] 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 [*School District*] to develop and maintain the trust of the community and staff.

## Training

All district employees play an important role in maintaining and improving air quality. Staff behaviors can affect air quality in a room, so staff need to be aware of policies. An informed employee is more likely to take steps to maintain good air quality, and an employee who understands IAQ is more likely to report IAQ concerns quickly and accurately. For these reasons, the [*School District*] staff are educated about IAQ. [*School District*] performs an annual IAQ training session for all operations staff as part of the employee “right to know” policy. The [*IAQ Preventive Maintenance Coordinator or point person*] or other qualified person performs the training. In addition to the general training, specific staff receive training related to their areas:[[8]](#footnote-8)

* Facilities staff: IAQ preventive maintenance, pesticides, chemicals, ventilation, operations, facilities maintenance, moisture
* Custodians: cleaning, moisture, chemicals, IAQ problems, proactive management

Teachers: animals, food, plants, furniture, clutter, chemicals, air movement, sensitive students

# Evaluation

To evaluate the effectiveness of our IAQ preventive maintenance plan, we will track key metrics and evaluate the effect on student health, the building’s performance and return on investment, as well as areas to improve in our plan. We will use the following tracking sheets or additional tracking sheets as needed and create a yearly evaluation report displaying progress made, explaining what worked and what did not, and will set or modify goals for following years based on those results:

* [Appendix D: IAQ Preventive Maintenance Sample Equipment Inventory](https://www.epa.gov/iaq-schools/indoor-air-quality-tools-schools-preventive-maintenance-guidance#appendices)
* [Appendix E: Annual Facility Equipment Preventive Maintenance Timeline](https://www.epa.gov/iaq-schools/indoor-air-quality-tools-schools-preventive-maintenance-guidance#appendices)
* [Appendix F: Sample IAQ Measurements Tracking Sheet](https://www.epa.gov/iaq-schools/indoor-air-quality-tools-schools-preventive-maintenance-guidance#appendices)
* [Appendix G: Monthly Health Statistics](https://www.epa.gov/iaq-schools/indoor-air-quality-tools-schools-preventive-maintenance-guidance#appendices)
* EPA’s [ENERGY STAR® PortfolioManager®](https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager)[[9]](#footnote-9): utility (energy, water and waste) measuring and tracking tool

Computerized Maintenance Management System: tracks preventive maintenance activities and repairs

Attachment 1: Example Preventive Maintenance Schedule[[10]](#footnote-10)

It is highly recommended that schools follow a preventive maintenance schedule—edit according to the operational needs of each school building. Consult your HVAC contractor, HVAC vendors, flooring manufacturer, cleaning product vendor, facility staff, etc.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Daily** | **Weekly** | **3 Months** | **6 Months** | **Yearly** | **2 Years** | **As Needed** |
| **Air-Handling Units** |  |  |  |  |  |  |  |
| *Intake Unobstructed*  |  |  | **x** |  |  |  |  |
| *Air Flows In* |  |  | **x** |  |  |  |  |
| *No Pollutant Sources Nearby* |  |  | **x** |  |  |  |  |
| *Intake Dampers Operational* |  |  | **x** |  |  |  |  |
| *Outdoor Damper Open (at least 10%)* |  |  | **x** |  |  |  |  |
| *Filters Replaced/Fitted Properly* |  |  | **x** |  |  |  |  |
| *Moisture (e.g., Drain Pans)* |  |  | **x** |  |  |  |  |
| *Cleanliness*  |  |  | **x** |  |  |  |  |
| *Belts* |  |  |  |  | **x** |  |  |
| *Lubrication* |  |  |  |  | **x** |  |  |
| *Cleaning of Heating and Cooling Coils* |  |  |  |  | **x** |  |  |
| *Cleaning of Drainage Areas* |  |  |  |  | **x** |  |  |
| *Calibration of Sensors and Controls* |  |  |  |  |  | **x** |  |
| *Cleaning of Ductwork* |  |  |  |  |  |  | **x** |
| *Airflow Balancing* |  |  |  |  |  |  | **x** |
| *Remove Snow Around Intakes, Exhaust, Stacks* |  |  |  |  |  |  | **x** |
| **Local Exhaust Systems** |  |  |  |  |  |  |  |
| *Functional* |  |  |  |  | **x** |  |  |
| *Correct Air Direction*  |  |  |  |  | **x** |  |  |
| *Rooftop Fans Undamaged and Unobstructed* |  |  |  |  | **x** |  |  |
| *Proper Exhaust Air Volume* |  |  |  |  |  | **x** |  |
| **General Building Cleaning** |  |  |  |  |  |  |  |
| *Garbage* | **x** |  |  |  |  |  |  |
| *Carpet and Hard Floors* | **x** |  |  |  |  |  |  |
| *Wet Mop Hard Floors* |  | **x** |  |  |  |  |  |
| *Tables*  |  | **x** |  |  |  |  |  |
| *Entry Mats*  |  | **x** |  |  |  |  |  |
| *Cushions and Upholstered Furniture* |  |  | **x** |  |  |  |  |
| *Shelves and Cupboard Tops* |  |  | **x** |  |  |  |  |
| *Ventilation Diffusers* |  |  | **x** |  |  |  |  |
| *Provide Each Room With All-Purpose Green Cleaner* |  |  | **x** |  |  |  |  |
| *Check and Maintain Vacuum Cleaners* |  |  | **x** |  |  |  |  |
| *Deep Clean Carpets and Refinish Hard Floors* |  |  |  | **x** |  |  |  |
| *Spot Deep Clean Small Spills/Stains* |  |  |  |  |  |  | **x** |
| **Other** |  |  |  |  |  |  |  |
| *Fill/Flush Floor Drains, Unused Sinks and Toilets*  |  | **x** |  |  |  |  |  |
| *Thermostats Functional* |  |  | **x** |  |  |  |  |
| *Moisture Inspection: Ceiling, Plumbing, Roof, Exterior* |  |  | **x** |  |  |  |  |
| *Check Hazardous Chemicals Storage* |  |  |  |  | **x** |  |  |
| *Replace Stained Ceiling Tiles* |  |  |  |  | **x** |  | **x** |

**Your preventive maintenance schedule could include the following:**

1. Examine light fixtures for dirty or burnt-out lamp ballasts.
2. Evaluate whether there is proper shielding of outdoor air intakes to prevent entry of wind-driven rain and snow.
3. Measure fresh air supply rates and compare them to design specifications to see whether the HVAC system is delivering adequate fresh air for the space and number of people it serves.
4. Check the fresh air supply intake more frequently to see if it is cut off.
5. Examine unit ventilators more frequently than other ventilation equipment to see if cleaning should be done more often (e.g., every month).
6. Evaluate plumbing hardware for inappropriate sizing for your needs.
7. Examine landscaping and grounds operations (e.g., presence of mud at building entrances, sloping land away from buildings, pest entry points, grass clippings discharged into unit vents).
8. Check the attic insulation and ventilation to keep the attic tempered and reduce the problem of ice dams on the roof.
9. Create a different checklist for each season with different areas to evaluate.
1. Text adapted from Des Moines Public Schools District, Iowa. 2012. *Indoor Air Quality Management Plan.* [www.dmschools.org/wp-content/uploads/2011/11/DMPS-IAQ-Mgmt-Plan-with-attachments.pdf](http://www.dmschools.org/wp-content/uploads/2011/11/DMPS-IAQ-Mgmt-Plan-with-attachments.pdf). [↑](#footnote-ref-1)
2. U.S. EPA. n.d. *Coordinator’s Guide for Indoor Air Quality: A Guide to Implementing an IAQ Program*. [www.epa.gov/iaq-schools/coordinators-guide-indoor-air-quality](http://www.epa.gov/iaq-schools/coordinators-guide-indoor-air-quality). [↑](#footnote-ref-2)
3. Des Moines Public Schools District, Iowa. 2012. *Indoor Air Quality Management Plan.* [www.dmschools.org/wp-content/uploads/2011/11/DMPS-IAQ-Mgmt-Plan-with-attachments.pdf](http://www.dmschools.org/wp-content/uploads/2011/11/DMPS-IAQ-Mgmt-Plan-with-attachments.pdf). [↑](#footnote-ref-3)
4. U.S. EPA. 2009. Indoor Air Quality Tools for Schools *Coordinator’s Guide: A Guide to Implementing an IAQ Program*. EPA 402/K-07/008. [www.epa.gov/sites/production/files/2014-11/documents/coordinators\_guide.pdf](https://www.epa.gov/sites/production/files/2014-11/documents/coordinators_guide.pdf). [↑](#footnote-ref-4)
5. Minnesota Department of Health. n.d. *Model IAQ Plan in Schools*. [www.health.state.mn.us/communities/environment/air/schools/plan.html](https://www.health.state.mn.us/communities/environment/air/schools/plan.html). [↑](#footnote-ref-5)
6. ASHRAE. 2017. *Standard 55 – Thermal Environmental Conditions for Human Occupancy.* [www.ashrae.org/technical-resources/bookstore/standard-55-thermal-environmental-conditions-for-human-occupancy](http://www.ashrae.org/technical-resources/bookstore/standard-55-thermal-environmental-conditions-for-human-occupancy). [↑](#footnote-ref-6)
7. ASHRAE. 2017. *Standards 62.1 & 62.2.* [www.ashrae.org/technical-resources/bookstore/standards-62-1-62-2](http://www.ashrae.org/technical-resources/bookstore/standards-62-1-62-2). [↑](#footnote-ref-7)
8. Des Moines Public Schools District, Iowa. 2012. *Indoor Air Quality Management Plan.* [www.dmschools.org/wp-content/uploads/2011/11/DMPS-IAQ-Mgmt-Plan-with-attachments.pdf](http://www.dmschools.org/wp-content/uploads/2011/11/DMPS-IAQ-Mgmt-Plan-with-attachments.pdf). [↑](#footnote-ref-8)
9. ENERGY STAR®. ENERGY STAR® PortfolioManager®. n.d. [www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager](http://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager). [↑](#footnote-ref-9)
10. Adapted from Minnesota Department of Health. n.d. *Model IAQ Plan in Schools*. [www.health.state.mn.us/communities/environment/air/schools/plan.html](https://www.health.state.mn.us/communities/environment/air/schools/plan.html). [↑](#footnote-ref-10)