

B. Heating, Ventilation, and Air Conditioning		
<p>B.1 Does each occupied room have ventilation that provides adequate outdoor fresh air for the number of occupants? If there is no mechanical fresh air ventilation, do you ensure good air circulation in rooms where children are present?</p> <p>Check rooms:</p> <ul style="list-style-type: none"> • no ventilation system or no operable windows. • no airflow from vents • vents are covered or obstructed (large items <3 feet away) 	<p>Repair or install a mechanical ventilation system—it should deliver outdoor air at a level sufficient for the number of people in each room. In a home, this could be a heat exchanger.</p> <p>If you have an air conditioner, see if it has an “air exchange” or “fan only” setting. Use as weather permits (follow manufacturer instructions).</p> <p>If a mechanical system is not present or affordable, then at least open windows, keep room doors open, run fans, and operate bathroom exhaust fans (where feasible during the day when children are present).</p> <p>Uncover ventilation diffusers and move large items (such as furniture) at least 3 feet away from diffusers.</p> <p style="text-align: center;">OK See Notes</p>	<p>An educational facility should have mechanical ventilation, to provide adequate outdoor fresh air. Air exchange will help to remove asthma triggers from the indoor air, such as dust, allergens, chemicals, and odors. It should also help to control humidity, which may contribute to mold and dust mites. If there is no mechanical ventilation system in a building, air movement and outdoor air exchange can be increased through other means. However, windows should not be opened frequently in buildings with adequate mechanical ventilation because this may disrupt the ventilation system and it also brings in unfiltered outdoor air. Also, don’t keep windows open when the a/c runs because this wastes energy and may create moisture problems due to warm air hitting cooled surfaces.</p>
<p>B.2 Does the building have working air conditioning?</p>	<p>Install or repair the air conditioning system in your building.</p> <p style="text-align: center;">OK See Notes</p>	<p>Air conditioning systems remove humidity from the air, which may help to reduce mold, bacteria, and dust mites. Also, air-conditioning allows windows to be closed during the summer, which reduces the amount of outdoor allergens and air pollution that enter the building (on days with elevated outdoor allergens and pollution).</p>
<p>B.3 Is their air movement during daily custodial cleaning? This could involve running the ventilation system or furnaces continuously or opening windows and turning on fans (until cleaning is complete).</p>	<p>Operate the ventilation system, furnace, or window air-conditioning unit on with outdoor air entering the building, until the custodial work is completed.</p> <p>If there is no mechanical ventilation system, then open windows and run fans during cleaning, as weather permits.</p>	<p>Cleaning causes dust and chemicals to contaminate the air. Running the ventilation system or opening windows will allow some of these contaminants to be diluted with fresh air or removed by the ventilation system filters. You may want to set the mechanical system timer to run during cleaning or switch the furnace to continuous fan operation.</p>
<p>B.4 Is there a written preventive maintenance schedule for periodic inspection, calibration, cleaning, and replacement of mechanical equipment (such as heating, ventilation, air conditioning system, and dehumidifier components)?</p> <p>Check equipment in boiler, mechanical, and storage rooms for:</p> <ul style="list-style-type: none"> • loud noise • vibrations • leaks 	<p>Develop a written schedule for the preventive maintenance of your heating, ventilation, air conditioning, and dehumidification equipment.</p> <p>The maintenance should include routine inspection, lubrication, filter changing, cleaning, and component replacement.</p> <p>Follow the manuals, manufacturer specifications and any contractor recommendations.</p> <p style="text-align: center;">OK See Notes</p>	<p>Preventive maintenance is crucial to ensure proper operation. Properly maintained equipment will filter out particles, remove humidity, control temperature, dilute air pollutants with fresh air, and save energy. Typically equipment should be inspected at least 4 times a year to ensure proper operation during different seasons. Air conditioners and dehumidifiers remove moisture from the air and tend to collect dust--this is a combination that can allow for mold or bacteria to grow inside these devices.</p>

<p>B.5 Check the room or area where furnace or ventilation equipment is located:</p> <ul style="list-style-type: none"> • water, moisture or mold • chemicals, clutter, garbage • air blowing into room 	<p>Correct moisture or mold problems</p> <p>Remove clutter, garbage, and chemicals</p> <p>Investigate and address excess negative pressure.</p> <p style="text-align: center;">OK See Notes</p>	<p>The area housing mechanical equipment should not have chemicals, garbage, or other items that may emit odors, dust, or microbial pollutants. These contaminants can enter the air stream and be quickly distributed through the building. Clutter and garbage attracts pests. Air blowing into the room can indicate that air is being sucked into the mechanical system from the hallway, which might mean less air is entering through the air intake.</p>
<p>B.6 Check inside of mechanical ventilation units and window air conditioning ventilators, including heating coils, cooling coils, fans, ducts, and condensate drainage areas:</p> <ul style="list-style-type: none"> • not accessible • dirty (metal not visible) • standing water or stains • strong odors • disrepair (gaps, loose belts, torn belts, broken doors,) vibration) • gap around door • insulation present on interior of ducts next to air handler 	<p>Install hatches, repair doors.</p> <p>Clean heavy coating of dust or debris</p> <p>Correct moisture problems.</p> <p>Remove source of odors</p> <p>Repair problems (e.g., replace belts and motors). Seal around doors.</p> <p>Remove or encapsulate porous interior insulation lining the ducts adjacent to air handlers.</p> <p>Consider hiring a qualified technician to investigate and address problems.</p> <p style="text-align: center;">OK See Notes</p>	<p>Air handling unit components need to be easily accessible for periodic inspection, replacement, and maintenance.</p> <p>A thick coating of dust or debris in the mechanical equipment can allow for mold growth, may clog the filters more quickly, and add to dust loading in rooms. On metal surfaces, the metallic color should be visible.</p> <p>The presence of water or stains indicate a moisture problem that may result in mold or bacteria growth. Standing water can be sprayed into the ducts. When the a/c is on water should quickly drain away from cooling coils, onto the pan, and out the drain line.</p> <p>Odors may be caused by microbial growth, chemical storage, roofing work, chemical treatments, recent renovation, or nearby outdoor sources.</p> <p>Proper belt tension and alignment is important for the efficient delivery of outdoor air.</p> <p>Excess vibration may affect fan speed and hasten deterioration of the mechanical equipment.</p> <p>Gaps around the mechanical unit may affect the air distribution and ultimately the amount of fresh air delivered to rooms.</p> <p>Interior insulation of ducts near the mechanical unit should be removed because these areas tend to collect moisture and dust, which may lead to mold growth.</p>

<p>B.7 What is the MERV rating or dust spot efficiency of filters in the heating and ventilation systems?</p> <p>Check filters in furnace and ventilation equipment:</p> <ul style="list-style-type: none"> • not accessible • overloaded • filter type not pleated or bag • gaps or tears allow air bypass • water or stains 	<p>Use filters that have the highest MERV rating or dust spot efficiency compatible with your heating or ventilation equipment (check with equipment manual, manufacturer, or ventilation contractors).</p> <ul style="list-style-type: none"> • Install access panels, if possible. • Replace filters more frequently and create a filter replacement schedule and attach to units. • Switch to pleated or bag filters. • Remove by-pass by changing filters and/or making repairs to the filter housing. • Correct moisture problem and clean any microbial growth <p style="text-align: center;">OK See Notes</p>	<p>Filters remove particles including outdoor asthma triggers such as pollens, molds, and vehicle pollution. In addition, some indoor allergens (e.g., cats, dogs, other furry mammals) are carried on fine particles that remain airborne for enough time to be returned to the mechanical unit where they may be removed by filtration. Filters vary a lot in their ability to trap particles. More particles are removed by filters that have higher MERV or dust spot efficiency ratings</p>
<p>B.8 Check in and around outdoor air intakes of ventilation equipment and around windows that are frequently opened:</p> <ul style="list-style-type: none"> • feathers/bird droppings, insects • grass clippings, leaves, etc • covered by snow, no protection against wind-driven rain/snow • plants touching • odors • buses/trucks idle <100 ft • plumbing exhaust or dumpster <30 ft • dampers broken, closed, different from computer setting 	<p>Clean leaves, grass clippings, and plant debris routinely from air intakes. Change landscaping activities to prevent organic matter from collecting in the air intake (for example, directing grass clippings away from the building during mowing).</p> <p>Hire a pest eradicator to remove pests in the ventilation system. Clean feathers and bird droppings according to NIOSH guidelines (see www.cdc.gov/niosh/docs/2005-109/). Prevent birds from entering intake by installing or repairing bird screens</p> <p>Keep air intakes free from snow drift--check weekly and after large snowfalls for snow blocking the outdoor air intake during the winter and remove as needed. Protect intake from wind-driven snow and rain.</p> <p>Trim trees and shrubs away:</p> <ul style="list-style-type: none"> • Investigate odor sources and correct problems. • Move parking and idling zones at least 100 feet away from the outdoor air intake and post signs asking drivers to turn engines off. • Move the plumbing exhaust at least 30 feet away from the air intake. • Keep the air intake dampers partially open at all times, unless there is a specific concern with extreme cold weather that may cause freezing in the system. Repair broken dampers and damper controls. <p style="text-align: center;">OK See Notes</p>	<p>The quality of air in a building is affected by the quality of outdoor coming into a building, which is greatly dependent on the conditions in and around the air intake and open windows. Organic matter, pests, water intrusion, garbage, and idling vehicles are some of the common problems in and near these areas can lead to contaminants entering the building. Dampers are metal flaps that control the amount of fresh air that enters buildings that have mechanical ventilation equipment. Under most conditions, dampers should be about 15-20% open, to allow for fresh air to enter the building which is critical to remove odors, chemicals, and dust. Ventilation computer settings can be obviously inconsistent with the actual damper position.</p>

<p>B.9 Are exhaust fans present and regularly used in the kitchen and in bathrooms?</p> <p>Check exhaust fans in bathrooms, chemical storage rooms, by copier, attached to clothes dryer, above oven, etc:</p> <ul style="list-style-type: none"> • not present • doesn't draw air (hold a layer of tissue paper against the exhaust vent—it should be drawn to the vent) • not being used • not ducted to outside (check attic) 	<p>Operate kitchen exhaust fans during cooking, washing dishes, and mopping floors.</p> <p>Operate bathroom exhaust fans all day or at least during hand-washing, using bathrooms, and mopping floors.</p> <p>Operate chemical storage room exhaust fans all day.</p> <ul style="list-style-type: none"> • Install exhaust systems in all bathrooms, kitchens, chemical storage rooms, copiers, and clothes dryers. • Repair, clean, or re-connect to the electrical grid. • Instruct all staff to use the bathroom exhaust ventilation unit; consider placing a note by the switch or using a timer that turns on with the lights and runs at least 20 minutes after lights are off. • Install ducting to the outdoor air. <p style="text-align: center;">OK See Notes</p>	<p>Working exhaust ventilation removes contaminants to the outdoors. It is necessary in various areas and by certain equipment. In bathrooms, kitchens, and storage room, there can be humidity, odors, chemicals, and particle pollution in the air. In addition, equipment, such as copiers, clothes dryers, gas space heaters, ovens, and fireplaces need exhaust ventilation to direct contaminants to the outdoors.</p> <p>Ideally, bathrooms should have automated exhaust systems that either run during business hours or are at least on a 20+ minute timer connected to the light switch. This ensures the equipment are used in bathrooms. Storage rooms should have continuous exhaust ventilation during the day. You may want to tape a piece of tissue paper against the vent for an easy visual indication that specific vents are working.</p>
<p>B.10 Do you have a working carbon monoxide detector in each room that has a fuel-burning appliance (non-electric), such as gas furnace, water heater, oven, space heater, dryer, etc?</p>	<p>Install carbon monoxide detectors in each room that has a gas or other fuel-burning appliance.</p> <p>Replace batteries and check the alarm siren twice a year.</p> <p style="text-align: center;">OK See Notes</p>	<p>The use of a carbon monoxide detector may alert you to a release of pollutants from a fuel-burning appliance. These pollutants can irritate airways and may trigger asthma attacks. When the alarm sounds, be sure to take proper measures. For details, see www.health.state.mn.us/divs/eh/indoorair/co/ind ex.html</p>

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