



Ventilation Systems and Indoor Air Quality

Indoor air quality (IAQ) refers to the air within buildings and structures, especially as it relates to the health, comfort, and well-being of occupants. Good indoor air includes air that is free from unacceptable levels of contaminants and provides a comfortable indoor environment including temperature and humidity.

While there are no federal regulations specifically for indoor air quality within non-industrial buildings in Canada, there are ventilation related requirements within the National Building Code and the Occupational Health and Safety Regulations. A properly designed, operated, and maintained HVAC (heating, ventilation, and air conditioning) system can provide a comfortable indoor environment and prevent the accumulation of odors, pollutants, and irritants in the indoor air.

Ventilation standards and guidelines for offices, healthcare settings, and educational facilities are published by the Canadian Standards Association (CSA) Group and the American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE). Ventilation standards commonly referred to include the following:

- National Building Code: *Division B Part 6 - Heating, Ventilating and Air-conditioning*
- Canada Occupational Health and Safety Regulations (SOR/86-304): *Division III - HVAC Systems*
- ASHRAE Standard 62: *Ventilation for Acceptable Indoor Air Quality*
- CSA Guideline Z204-94: *Guideline for Managing Air Quality in Office Buildings*
- ASHRAE Standard 170-2021: *Ventilation of Health Care Facilities*
- CSA Z317.2:19: *Special requirements for heating, ventilation, and air-conditioning (HVAC) systems in health care facilities*
- ASHRAE TC9.7: *Design Guidance for Education Facilities: Prioritization for Advanced Indoor air Quality*

Preventative maintenance and inspection of the ventilation (HVAC) system is important as it ensures optimum indoor air quality, extends the life of the ventilation system, and avoids costly repair. ASHRAE standard 180-2018: *Standard Practice for Inspection and Maintenance of Commercial Building HVAC Systems* outlines details procedures and establishes minimum HVAC inspection and maintenance requirements that preserve a system's ability to achieve acceptable thermal comfort, energy efficiency, and indoor air quality.

Ventilation systems are complex and changes to the system can have unintended effects, adjustments should be made in consultation with a HVAC specialist to verify intended parameters and appropriate maintenance procedures.

While the standards list above provide guidance on the day-to-day operation and routine maintenance of ventilation (HVAC) systems, there is specific guidance for buildings being utilized as clean air spaces during extreme weather events such as wildfires. See appendix for information on Clean Air Spaces including a Clean Air Space Checklist. Additional details on clean air spaces can be found in Health Canada's *Guidance for Cleaner Air Spaces during Wildfire Smoke Events* and *ASHRAE 44-2024 Protecting Building Occupants from Smoke During Wildfire and Prescribed Burn Events*.



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Cleaner Air Spaces

The document provides information for First Nations community leadership and building/facility operators on cleaner air spaces that can be utilized during wildfire smoke events. Additional details on cleaner air spaces can be found in Health Canada's [Guidance for Cleaner Air Spaces during Wildfire Smoke Events](#).

Wildfire smoke contains a variety of pollutants that are harmful to health. During a wildfire smoke event, staying indoors in a place that can provide cleaner and cool air can help reduce exposure to smoke.

When community members are unable to maintain cleaner air indoors at home during a wildfire smoke event or do not have air conditioning and it is too warm to stay inside with the windows open, community cleaner air spaces can provide relief from wildfire smoke conditions. This is especially important for sensitive or medically fragile individuals; these spaces can also help to combat isolation during a prolonged smoke event.

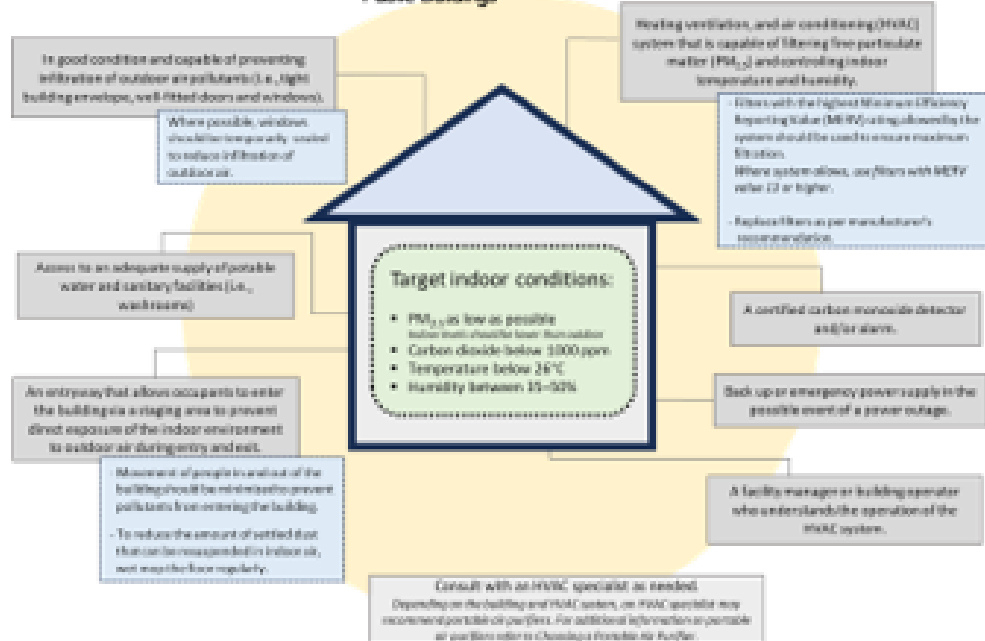
Cleaner air spaces are public indoor areas, rooms or buildings that limit infiltration of outdoor air pollutants and aim to keep the indoor air as clean as possible. In communities, buildings such as schools, community centres and band halls have the potential to be cleaner air spaces and offer relief to community members during wildfire smoke events.

Long-term care, personal care homes and health-care facilities should be given special consideration for cleaner air spaces as clients cannot be easily relocated in these types of facilities.



CLEANER AIR SPACES

Public Buildings



For guidance on food safety, waste, pest control and sanitation, consult with your community's Environmental Public Health Officers.

In certain cases, individuals may decide or be required to shelter at home during wildfire events. In these circumstances, individuals can limit exposure by preventing infiltration of outdoor pollutants and reducing other sources of indoor air pollutants within the house.

The following strategies can be employed to help protect indoor air quality:

- Close all windows and doors.
 - Where possible, seal gaps around windows and doors to prevent infiltration of outdoor pollutants.
- Limit the use of exhaust fans and external vents.
- Where applicable, turn the fresh air intake off and set heating ventilation, and air conditioning (HVAC) system to recirculation mode.
 - Use filters with the highest minimum efficiency reporting value (MERV) rating allowed by the system to ensure maximum filtration.
 - It is recommended to maintain indoor temperature below 26°C.
- Avoid creating other air pollution (e.g., smoking, burning candles, gas and wood stoves, and certain cleaning products).
- Unless your vacuum is equipped with a HEPA filter, avoid vacuuming as this can stir up dust. Settled dust can be removed by wiping and wet mopping.
- Using portable air purifiers (with HEPA filters) can reduce indoor particulate levels.
 - For additional information on air purifiers please refer to *Using an Air Purifier to Filter Wildfire Smoke*.

Cleaner Air Space **CHECKLIST**



Smoke from wildfires produces a variety of pollutants that can have an impact on human health. Exposure to these pollutants may be reduced by choosing to remain indoors during a wildfire event and taking steps to limit infiltration of these pollutants, while controlling other factors associated with poor indoor air quality. The following are recommendations for selecting or retrofitting a building to be used as a cleaner air space and operational considerations during a wildfire event.

Preparing the cleaner air space:

- Select a central heating, ventilation, and air conditioning (HVAC) system that is capable of filtering fine particulate matter (PM_{2.5}), and controlling temperature, relative humidity, and air exchange rate. An HVAC specialist may also recommend additional air filtration or air conditioning equipment for use during a wildfire smoke event, where necessary.
- If available, consider having a vestibule or other entryway that does not directly expose the indoor environment to outdoor air, to limit infiltration of pollutants during entry and exit.
- Create a tight building envelope (i.e., well sealed doors and windows) to prevent infiltration of pollutants from outdoor air.
- Install carbon monoxide (CO) alarm(s), preferably those featuring a low-level digital display showing real-time readings.
- Install PM_{2.5} monitors to allow simultaneous measurement of indoor and outdoor levels.
- Ensure adequate space is available to accommodate the highest capacity of occupants.
- Ensure suitable electrical capacity to handle additional equipment.
- Consider emergency power in the possible event of a power outage, keeping in mind to locate any generators away from the building and downwind of any clean air intakes.



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During a wildfire event:

- Assign a facility manager who has an understanding of the HVAC system operation and the air distribution of the building, and can monitor indoor and outdoor pollutant levels and control the environmental conditions.
- Use filters for the HVAC system with a minimum efficiency reporting value (MERV) rating of 13 or more to remove $PM_{2.5}$. Ensure replacement filters are available. Replace filters as required. Odour-removing filters may be considered for occupant comfort.
- Consider using portable air cleaners with high efficiency particulate air filters.
- Recirculate the air when outdoor conditions are poor and draw in fresh air when the smoke plume abates to reduce the levels of pollutants trapped indoors, such as carbon dioxide (CO_2).
- Evacuate immediately if the CO alarm sounds. Consider using monitoring alarms with low-level displays and take appropriate action as recommended. Evacuation procedures should be planned in advance.
- For buildings with a kitchen or cafeteria, limit cooking and using exhaust fans to periods when outdoor smoke levels are low. Individual HVAC air handling systems may need to be adjusted or curtailed when the building is used as a cleaner air space, as determined by an HVAC specialist or facility manager.
- Strive for a humidity level of 35 to 50% and a temperature of 26 °C or lower, using air conditioning and dehumidifiers.
- Minimize movement of people in and out of the building.
- Wet-mop the floors and other surfaces to reduce the amount of settled dust that can be resuspended in indoor air.