

Ventilation in the workplace

OHS information for employers and owners

This bulletin explains how ventilation can help control the risk of harm from airborne contaminants in indoor workplaces.

KEY INFORMATION

- Ventilation replaces potentially contaminated indoor air with clean outdoor air and can filter recirculated air.
- Ventilation can sometimes eliminate airborne contaminants at their source.
- Ventilation is one factor in good indoor air quality.
- Ensuring proper ventilation is an important health and safety responsibility.

Why ventilation

Airborne contaminants can cause a number of adverse health effects, depending on a number of factors. These factors include the nature and amount of the contaminant, and length and frequency of exposure. Dusts, moulds, allergens, fibres, gases, fumes, vapours, and infectious agents such as respiratory viruses or bacteria are some examples of airborne contaminants.

Contaminant means a chemical, biological or radiological material in a concentration that will likely endanger the health and safety of a worker if it is inhaled, ingested or absorbed.



- Section 1, Part 1, OHS Code

Ventilation is one way that employers or owners (as applicable, see below) can control airborne contaminants, help improve [indoor air quality](#) and in doing so, meet specific health and safety obligations.

General duty requirements

Part 1 of the *Occupational Health and Safety Act* sets out the general duties of regulated work site parties, including employers and owners.

The general duties of **employers** include:

- Ensuring the health, safety and welfare of workers.
- Ensuring the health and safety of persons at or in the vicinity of their work site.

Learn more in [Guide to OHS: Employers](#).

The general duties of **owners** include:

- Ensuring that their property is provided and maintained so that it doesn't endanger anyone's health and safety.
- Communicating information about any hazards related to their property to anyone carrying out work on the site.

Under the *Occupational Health and Safety Act*, owner means the registered titleholder of land where work is carried out, or the person (such as a property manager) who has agreed to carry out the owner's health and safety duties. The act exempts private residence owners from the definition of owner, unless a business, trade or profession operates from the residence.



Note that if a work site party has more than one role – for instance, if the employer also owns the work site property – they must meet the requirements of both roles.

Part 2 OHS Code requirements

Part 2 of the Occupational Health and Safety (OHS) Code sets out an employer's hazard assessment and control obligations. Ventilation is an engineering control. Where [reasonably practicable](#), engineering controls are the required first choice when a hazard can't be eliminated.

If a hazard can't be eliminated or controlled by a single reasonably practicable method, an employer may use a combination of controls.

For more on Part 2 requirements, read [Hazard Assessment and Control: a handbook for Alberta employers and workers](#).

In instances where an employer doesn't own the building where work is carried out, it is the employer's responsibility to bring any property-related health and safety concerns to the owner. It is also the employer's responsibility to ensure that the concerns are addressed.

Part 26 OHS Code requirements

Part 26 of the OHS Code applies to work sites where mechanical ventilation systems are installed to control worker exposures to harmful substances or unsafe atmospheres. This is different from a general building ventilation system. Learn more about Part 26 of the code on [page 3](#) of this bulletin.

How ventilation works

Ventilation is the process of supplying and removing air by natural or mechanical means to and from any space. The purpose is to provide healthy air for the indoor occupants.

There are two main types of ventilation: dilution or general ventilation (such as opening windows) and mechanical ventilation (such as fans or local exhaust ventilation).

In buildings with an HVAC (heating, ventilation and air conditioning) system, air may be recirculated. In this case, the HVAC system dilutes some indoor air with outdoor air and filters it, before returning it into an occupied space.

Good ventilation makes an indoor space safer by:

- Moving some clean outdoor air into the space, which dilutes potentially contaminated air.
- Removing contaminated air through filters, vents, windows or doors.

Portable or ceiling fans, or single unit air conditioners, may move air around a room, but they do not exchange or purify air or improve ventilation.

Factors that impact ventilation

There are multiple factors that affect ventilation at a workplace. These include:

Work activities

Work activities can generate airborne contaminants. Physical and chemical properties of airborne contaminants may impact the efficiency of ventilation or the choice of ventilation systems. Examples of some activities that can introduce airborne contaminants are:

- Dust-generating activities, such as sawing or sanding.
- Using materials that produce gases, vapours or dust, such as solvents, glues, cleaning products, silica or flour.
- Using equipment such as gas or propane furnaces, stoves, heaters or generators or photocopiers that can produce harmful exhaust emissions.
- Activities that produce a relatively high amount of respiratory droplets or particles, such as singing, speaking loudly, yelling, or exercise.

Building location and design

A building's condition, construction, contents, design or renovation, and location can also introduce airborne contaminants. Some examples are:

- An energy efficient/airtight building design that does not bring enough outdoor air into the indoor spaces.

- Building repairs leading to airborne contaminants being drawn into or created within the building.
- Building renovations – such as new walls or partitions – changing air flow and circulation.
- Poorly located fresh air intakes allowing vehicle exhaust or other localized outdoor air contaminants to enter a building.
- Outdoor activities that introduce airborne contaminants.
- Water damage leading to excessive levels of mould or bacteria in indoor air.
- New furniture or building materials (for example, particleboard, carpets, textiles or paint) off-gassing.

Room size and occupancy

All other factors being equal, a smaller room will fill up with airborne contaminants faster than a larger space in the absence of any ventilation.

If infectious respiratory droplets and aerosols are a hazard, crowded spaces and close proximity between people can increase the probability of exposure. In general, overcrowding may mean people are closer together in a smaller space, and there isn't enough air exchange for the people in the space. This means that the ventilation systems may not be able to dilute the air quickly enough to eliminate or effectively control the hazard.

Technical requirements

Where HVAC systems are in use, they must be properly designed for the size of the space, number of occupants, heat and humidity sources, and location and amount of contaminants. An employer may wish to consult an HVAC professional for assistance.

Part 3 of the OHS Code requires employers ensure that equipment is installed, used and maintained according to manufacturer's specifications or certifications specified by a professional engineer.



Improving ventilation

The best ways to improve ventilation depend on the specific setting and situation. These may include some steps that an employer or owner (as applicable) can carry out. For example, the [Public Health Agency of Canada recommendations](#) in relation to mitigating the transmission of infectious diseases include the following:

- Open exterior doors and windows for a few minutes – ideally, more than one at a time. Doing this for a few minutes during the day can improve air quality (even in winter) with a minimal impact on the indoor temperature.

- In buildings with an HVAC system, run the system fan continuously at low speed to provide air movement and filtration without draft.
- In non-residential buildings, run the system for two hours at maximum outside airflow before and after the building is occupied.
- Where appropriate, use exhaust fans that vent to the outside (for instance, in kitchens or bathrooms) to help remove potentially contaminated air.
- With HVAC systems that recirculate air:
 - Ensure that filters are well sealed without a bypass.
 - Maintain systems (for example, change filters) per manufacturer's specifications.
 - Select filters with sufficient minimum efficiency reporting value (MERV) ratings that are more efficient at removing particles.

For more on actions an employer can take to improve ventilation, read the [Indoor Air Quality Tool Kit](#).

Additional controls

If general ventilation isn't adequate to eliminate or control the hazards from airborne contaminants, an employer or owner (as applicable) must take additional measures. These will depend on the specific nature of the contaminant and exposure, and the risks posed.

Some examples of additional measures are:

- Installing source capture solutions (that is, local exhaust ventilation) such as fume hoods or exhaust fans to directly remove air contaminants created by specific work activities or materials.
- Using portable air filtration devices with high-efficiency particulate air (HEPA) filters to reduce the concentration of specific contaminants in the air.
- Introducing procedures to reduce exposure to airborne contaminants. Examples include:
 - Limiting exposure duration or frequency.
 - Ensuring proper storage of contaminants as per manufacturer specifications.
 - Positioning workers upwind from air flow.
 - Limiting the number of people in a specific indoor space.
 - Physical distancing.
 - Providing breaks or alternate work locations.
- As a last choice, using personal protective equipment appropriate to the specific hazard.
 - Personal protective equipment requirements are set out in Part 18 of the OHS Code.

Every hazard requires elimination or control measures. Make sure the measures you put in place eliminate or control the particular hazards at your work site.



Don't introduce new hazards

Employers must also ensure that a control introduced for one hazard does not create a new hazard.

For instance, the [Public Health Agency of Canada recommends](#) an optimal humidity of between 30% and 50% to help prevent droplets from individuals with the SARS-CoV-2 virus from shrinking and staying suspended in air, but also cautions that increasing humidity too much can lead to mould growth and mites. This is an important consideration during cold winter periods, when condensation can easily form if air circulation is too low or relative humidity is too high.

Part 26 requirements

Application

Section 386 of the OHS Code states that Part 26 requirements apply to work sites where mechanical ventilation controls the following:

- Airborne or biological contaminants that exceed (or are likely to exceed) occupational exposure limits.
- Potentially hazardous (by kind or quantity) dust, fumes, gas, mist, aerosols, smoke, vapour or other particulates.
- A flammable atmosphere.
- An atmosphere with less than 19.5 percent or more than 23 percent by volume of oxygen.

Occupational exposure limits which are found in Part 4 and Schedule 1, Table 2 of the OHS Code.



Part 4 of the code also states additional requirements related to chemical and biological hazards, and harmful substances.

Make sure you know and comply with all requirements related to the specific hazards at your work site.

Design

Where Part 26 of the OHS Code applies, employers must ensure that a ventilation system is designed, installed and maintained according to established engineering principles. The employer must also ensure that the system is maintained and operated according to the manufacturer's specifications.

Section 387(2) states minimum technical requirements an employer must meet in relation to mechanical ventilation systems. Under this section, the employer must ensure that:

- Externally vented air from the system isn't drawn back into the building.

- The volume of replacement outdoor air (make up air) is sufficient to ensure the system's effectiveness.
- If applicable and reasonably practicable, recirculated air discharged back into the work site doesn't exceed 10 per cent of a given contaminant's occupational exposure limit.

Ventilation system failure

Where Part 26 of the code applies, employers must meet specific requirements related to the possibility of ventilation system failure.

An employer must ensure that provision is made to warn workers immediately if a ventilation system fails and to provide for their protection.



- Section 388(1), Part 26, OHS Code

Training is required

Knowing how to use ventilation systems properly is key to ensuring it is an effective control. Where Part 26 of the code applies, employers with mechanical ventilation systems that control certain types of exposure must ensure their workers:

- Are trained in the correct use of the system.
- Participate in the training.
- Use the system properly.

For more information

Guide to OHS: Employers (LI009)
ohs-pubstore.labour.alberta.ca/LI009

Hazard Assessment and Control: a handbook for Alberta employers and workers (BP018)
ohs-pubstore.labour.alberta.ca/bp018

Indoor Air Quality (GH014)
ohs-pubstore.labour.alberta.ca/GH014

Indoor Air Quality Tool Kit (GH015)
ohs-pubstore.labour.alberta.ca/gh015

Legal terms 101: "reasonably practicable" (LI015)
ohs-pubstore.labour.alberta.ca/li015

Public Health Agency of Canada: Guidance on indoor ventilation during the pandemic
canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/guidance-documents/guide-indoor-ventilation-covid-19-pandemic.html

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Contact us

OHS Contact Centre

Anywhere in Alberta

- 1-866-415-8690

Edmonton and surrounding area

- 780-415-8690

Deaf or hard of hearing (TTY)

- 1-800-232-7215 (Alberta)

- 780-427-9999 (Edmonton)

Notify OHS of health and safety concerns

alberta.ca/file-complaint-online.aspx

Call the OHS Contact Centre if you have concerns that involve immediate danger to a person on a work site.

Report a workplace incident to OHS

alberta.ca/ohs-complaints-incidents.aspx

Website

alberta.ca/ohs

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