



# Ventilation



If too little outdoor air enters your facility, pollutants can accumulate to a level that can pose health and discomfort problems for your employees. Unless they are built with special mechanical means of ventilation, facilities that are designed and constructed to minimize the amount of outside air that can *leak* into and out of the facility may have higher pollutant levels. However, because some weather conditions can drastically reduce the amount of outside air that enters your facility, pollutants can build up in facilities that are normally considered *leaky*.

Ventilation is defined as the process of supplying air to, or removing air from, any space by natural or mechanical means. General ventilation uses the movement of air within the general work space to displace or dilute contaminants with fresh outside air. General ventilation of the workplace also contributes to the comfort and efficiency of employees because working under extreme conditions of temperature and humidity may have an adverse effect on employee productivity and health.

In the last several years, a growing body of scientific evidence has indicated that the air within our working environments can be more seriously polluted than the outdoor air, even in the largest and most industrialized cities. The levels of air pollution from individual sources may not pose a significant risk to health by themselves, but most working environments have more than one source that contributes to indoor air pollution. Fortunately, steps can be taken to both reduce the risk from existing sources of indoor air pollution, and prevent new sources from occurring.

## Effects

Health effects from indoor air pollutants fall into two categories:

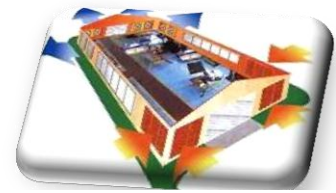
- Those that are experienced immediately after exposure; and
- Those that do not show up until years later.

Immediate effects, which can show up after a single exposure or repeated exposures, include irritation of the eyes, nose, throat, headaches, dizziness, and fatigue. These immediate effects are usually short-term and treatable. Sometimes, the prescribed treatment is simply to eliminate the person's exposure to the source of the pollution, if the source can be identified. Symptoms of some diseases, such as asthma, can show up soon after exposure to some indoor air pollutants.

The likelihood of an individual developing immediate reactions to indoor air pollutants depends on several factors, such as age and pre-existing medical conditions. In other cases, whether a person reacts to a pollutant can be determined by individual sensitivity, which varies from person to person. Some people can become sensitized to biological pollutants after repeated exposures, and it appears that some people can become sensitized to chemical pollutants as well.



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Certain immediate effects are similar to those from colds or other viral diseases, so it is often difficult to determine if the symptoms are a result of exposure to indoor air pollution or some other factors. For this reason, it is important to pay attention to the time and place the symptoms occur. If the symptoms fade or go away when an employee is away from work, and return when the employee returns to work, an effort should be made to identify indoor air sources at the worksite that may be possible causes.

Some effects may be made worse by an inadequate supply of outside air or from the heating, cooling, or humidity conditions prevailing in the facility. Other health effects may show up either years after the exposure has occurred, or only after long or repeated periods of exposure. These effects, which include respiratory diseases, heart disease, and cancer, can be severely debilitating or even fatal.

Legionnaire's disease is also a concern for those who work indoors. The bacteria *Legionella* causes the respiratory illness Legionnaire's disease and was first recognized in 1976 during an epidemic of pneumonia, which affected persons attending an American Legion convention. Persons with Legionnaire's disease typically have respiratory symptoms, and often have headaches, confusion, and sometimes diarrhea.

Some health effects can be useful indicators of poor ventilation that can lead to an indoor air quality problem. If you think employees have symptoms that may be related to the working environment, you should discuss this with your health and safety personnel.

### Causes

While pollutants commonly found in indoor air can be responsible for many harmful effects, there is considerable uncertainty about what concentrations or periods of exposure are necessary to produce specific adverse health effects. Further research is needed to better understand which health effects can occur after exposure to the low-level pollutant concentrations as well as higher-level concentrations.

There are two primary causes of indoor air quality problems: indoor sources of air pollution and improper ventilation of your facility. Indoor pollution sources release gases or particles into the air and are the primary cause of indoor air quality problems. Inadequate ventilation can also increase indoor pollutant levels by not bringing in sufficient outside air to dilute emissions from indoor sources, and by not carrying indoor air pollutants out of your facility. High temperature and humidity levels can also increase concentrations of some pollutants.

Another way to judge whether your facility has or could develop indoor air problems is to identify potential sources of indoor air pollution. Although the presence of such sources does not necessarily mean that you have an indoor air quality problem, being aware of the type and number of potential sources is an important step toward assessing the quality of air in your workplace.



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A third way to decide whether your workplace may have poor indoor air quality is to look for signs that there are airflow problems throughout your facility. Some things that could indicate that your workplace may have an indoor air quality problem include:

- Stuffy air;
- Dirty central heating equipment;
- Dirty central air conditioning equipment; and
- Moisture condensation on windows or walls.

In addition, your facility's ventilation system should be checked to ensure that it is operating properly. Ventilation systems should do a number of different things, including:

1. Preventing the degradation of workplace air by carbon dioxide buildup, biological organisms, odors, and heat.
2. Providing makeup air that replaces air that has been exhausted outside.
3. Heating replacement air through industrial heating processes, such as oil, gas, or steam.

Whenever employee exposure, without regard to the use of respirators, exceeds the permissible exposure limits (PELs) of the air contaminants rule, a local exhaust ventilation system must be provided and used to maintain employee exposures within the prescribed limits. Local exhaust ventilation systems consist of five parts:

1. Hoods that draw in airborne contaminants. The exhaust system hood is the point of entry into the duct system.
2. Ducts that carry contaminated air to a central point. After contaminated air has been drawn into a hood, ducts serve the purpose of carrying that air to an air cleaner, or to the outdoors.
3. An air-cleaning device, such as a dust arrester, for purifying the air before it is discharged. Types of air cleaners include industrial air cleaners, whose purpose is to remove airborne contaminants, and air cleaners that handle relatively high rates of airflow at low static pressure.
4. A fan and motor to create the required airflow through the system.
5. A stack to disperse remaining air contaminants