

# Fighting Indoor Air Pollution

## How to ensure adequate ventilation

Indoor air pollution is a growing problem. Windows that can't be opened, fumes from the increasing number of office machines, and reduced ventilation for energy-saving purposes all contribute to it.

In addition to the machine emissions, the most common office air pollutants are cigarette smoke; chemicals such as those used in ink and glues; and contaminants from building cooking areas, loading docks and garages.

Unless an office is properly ventilated, pollutants can build up to levels that are unhealthy and possibly dangerous. Unfortunately, ventilation systems are not designed to remove pollutants, but simply to supply and circulate fresh air. With a limited number of contaminants, this may reduce the pollution level sufficiently—but only if the system is correctly designed and in good working order.

Before determining if the ventilation system in your office is adequate, let's talk about what the system is composed of.

### The three basics

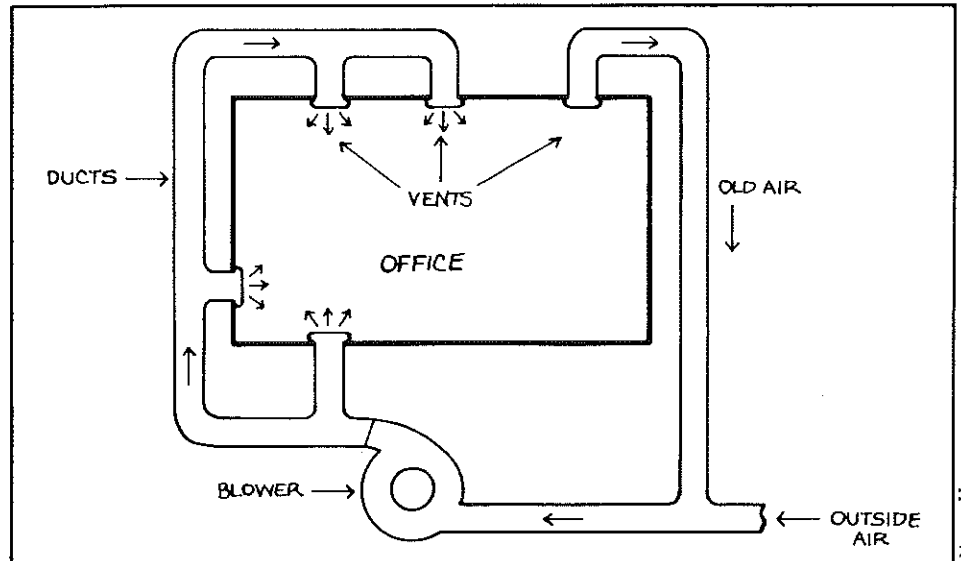
The three basics are the blower which moves the air, the duct work which delivers it to the room, and the vents which distribute it. The vents may be either supplying air or removing (exhausting) it.

No office receives 100 percent fresh, outside air. Usually, the fresh air is mixed with used office air and then redistributed. In some buildings, in fact, there is virtually no fresh air. The same air may be recirculated and breathed over and over again.

This is what to look for in evaluating your ventilation system:

**1. Does your workplace have a ventilation system?**

This is not as odd a question as it may seem. Some buildings do not have ventilating systems. You can check to see if yours does by walking around and looking for vents and ducts. The pictures on this page give some examples of what to look for.



Nancy Hannans

**This is the typical layout of an office ventilation system. The blower moves the air; the ducts deliver it to the room; and the vents supply or remove it.**

**2. Is the system on all the time?**

Often, the air circulation in a building will stop at 5 P.M. or on weekends even though people may regularly work late or night shifts. In many offices, large duplicating and printing jobs are done at night, and machines can produce a high volume of pollutants.

You can test whether the system is on by holding a tissue near the vent. If it moves, air is being circulated. Do this before and after five.

**3. Is the system continuous or does it go on and off during the day?**

Some ventilation systems are on a time cycle. This means that the blower will turn on and off at regular intervals throughout the day. If your workplace is constantly generating air pollutants, such a system may not be giving you enough fresh air. The pollutants may accumulate while the system is off. Check the airflow regularly during the day, as you did above, to find out if you are getting fresh air continuously.

**4. Does each room have a vent?**

Walk around and make a listing of the number of vents per room. Make sure you look on the walls and floors

—and remember, no vents, no air.

**5. Are the vents supplying or removing air?**

In each room there should always be a supply and an exhaust vent. This type of ventilation system is called "dilution ventilation." You can determine which vents are bringing air in and which are removing it by holding a tissue at the face of the vent. If air is moving past, you will be able to see it.

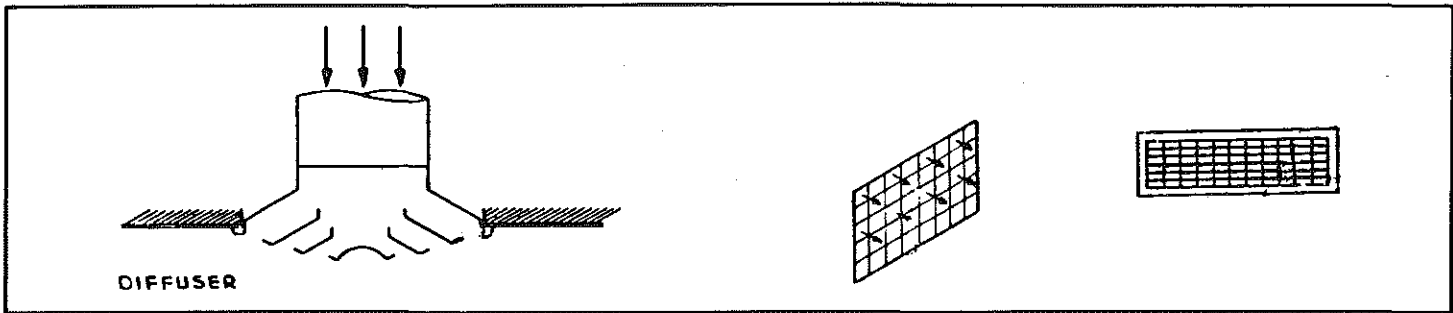
**6. Are the vents for supply and exhaust right next to each other?**

When supply and exhaust vents are too close, the clean, fresh air gets sucked out of the room before it has adequately circulated. This is called "short-circuiting." It is the result of poor engineering design, and is difficult to repair.

**7. Are the vents blocked in any way?**

Exhaust and supply vents will work only if the air can move freely around them. Blockage by walls, partitions, or even piled up boxes or files, will obstruct the air flow and reduce the ventilation efficiency.

*continued*



At center and right are the kind of vents you will see in your office, supplying and removing air. Drawing at left shows how air is blown through a diffusing vent.

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**8. Are there any "dead spaces" in your office?**

"Dead spaces" are those in which no air is replaced and in which pollutants will therefore build up. You can check to see if there are any in your office by lighting a match and noticing how the smoke moves. (Inexpensive smoke tubes are also available for this purpose.) Does it flow toward an exhaust vent or simply stay in one place? If it doesn't move, pollutants too will remain in the air; they are not being exhausted. The principal reason for dead spaces is poor placement of supply and exhaust vents.

**9. Do office areas with printing and copying machines have adequate air supply and exhaust?**

You can find out by counting the vents, determining which way the air is moving and looking for dead spaces. For some machines, general ventilation is insufficient. You will need extra vents near the source of the fumes emitted.

**10. Do you have control over your vent system?**

Some offices make it possible for workers to have control over the ventilation. You may be able to enter the fan room and to turn the blower or fan supplying the air up or down. Check with your building maintenance office to see if you can do this.

**11. Is there a smoke detector in your ventilation system?**

There should be one. It is essential for early signaling of a fire. The detector should be located in the duct taking the air out of the office.

**12. Is the temperature and humidity adequate?**

The importance of a comfortable temperature is obvious. But comfort

also means proper humidity, or water in the air. When the office air is too dry your nasal passages dry up. You may get headaches and become more susceptible to colds, flus and other infections. When the air is too humid you also feel uncomfortable. Humidity makes a cold room feel colder and a hot room feel hotter.

**Indoor air pollution measurements**

In order to determine just how good or bad is the air in your office, you will have to test it. You may test for 1) the amount of air flow, 2) the amount of specific air pollutants or 3) the amount of heat and moisture. Some of these measurements are easily determined while others require specialized equipment.

For flow measurements you will need an airflow meter, also called a velometer. These are not very expensive and are usually able to measure both air coming into a room from the supply vent and air going out through the exhaust vent.

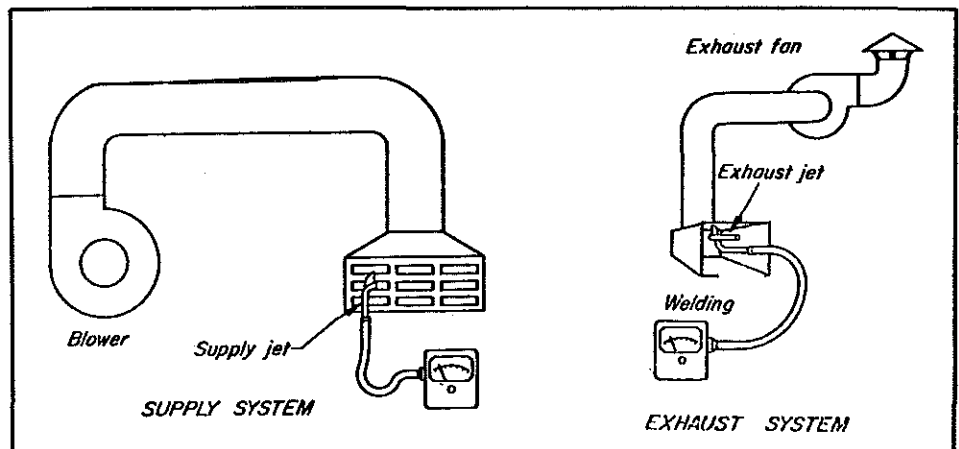
Smoke tubes, which are available in hardware stores, can also be used. But these will tell you only where the air is going and not how much.

The readings from a velometer are in cubic feet per minute of air. Here is a listing of what the numbers should be:

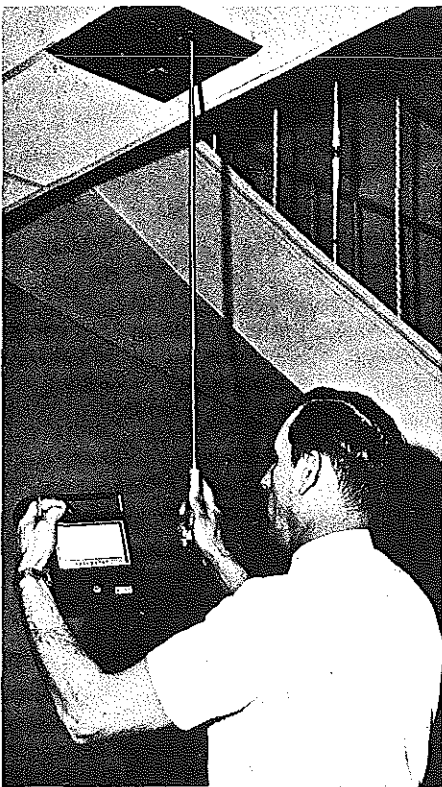
Continuous exposure	Air velocity (ft. per min.)
Air conditioned space	50-75
Fixed work station, general ventilation or spot cooling:	
sitting	75-125
standing	100-200
Intermittent exposure, spot cooling or relief stations	
Light heat loads and activity	1000-2000
Moderate heat loads and activity	2000-3000
High heat loads and activity	3000-4000

Your local health department will usually set required minimum ventilation standards for office buildings, but these standards vary from state to state. Check with your state, county or city health department to see how your workplace measures up to the health

Drawings show how a velometer is attached to a supply and an exhaust vent.



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Alnor Instrument Company

**This worker is using a velometer to measure the flow of air from a diffusing vent. The velometer has an extra-long probe to reach the ceiling.**

code, and if there is a violation.

**Measurement of specific air pollutants** usually requires very special instruments which may be difficult to obtain. However, some pollutants you may want to look for, even without exact measurements, are the following:

**Carbon monoxide**—from cigarettes, gas heaters or any cooking or burning. This is a chemical asphyxiant which robs your body of needed oxygen and can cause headaches, nausea and dizziness.

**Carbon dioxide**—from insufficient air exchange. This can also cause headaches, nausea and dizziness.

**Ozone**—from any machine that produces an electrical spark, such as a duplicating machine. This can be a respiratory irritant.

**Smoke and dusts**—from powders, burning substances, cigarettes. These can cause eye and throat irritation, coughing and, if particularly heavy, lung disease.

**Microbes** (bacteria, fungi and viruses)—from cooling water used in the ventilation system. These can cause colds, influenza and such infectious diseases as Legionnaires' Disease.

**Oxides of nitrogen**—from high tem-

perature machines, hot plates, cooking gas. These can cause watery eyes and irritations of the respiratory system.

**Miscellaneous chemicals**—such as solvents from glues, paints and other office supplies, or chemicals used in duplicating machines, such as toners, dyes and developers.

**Measurements for temperature and moisture** are easily made. Temperature can be determined by any common thermometer, but be sure that checks are made on such places as exhaust vents, supply vents, halls and dead spaces.

Moisture can be measured by a hydrometer, with the readings in percent relative humidity. The higher the number, the more water is in the air and, usually, the more discomfort there will be. But, as noted above, too low a moisture reading can also be bad.

For more information about measuring ventilation in your workplace, write to the Women's Occupational Health Resource Center at the address on page 6.

*Single copies of this article may be ordered from WOHRC at 25 cents apiece.*

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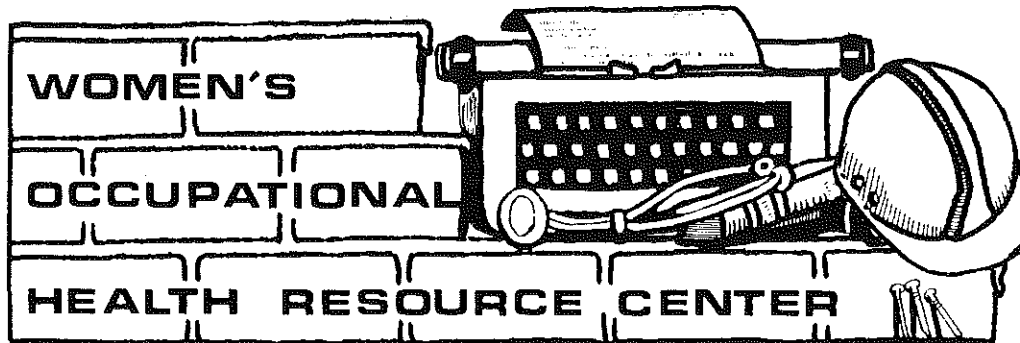
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The work of the Resource Center is to fill a wide information gap because although women now account for nearly half of the nation's workforce, concern over occupational health has continued to concentrate on men's jobs.

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