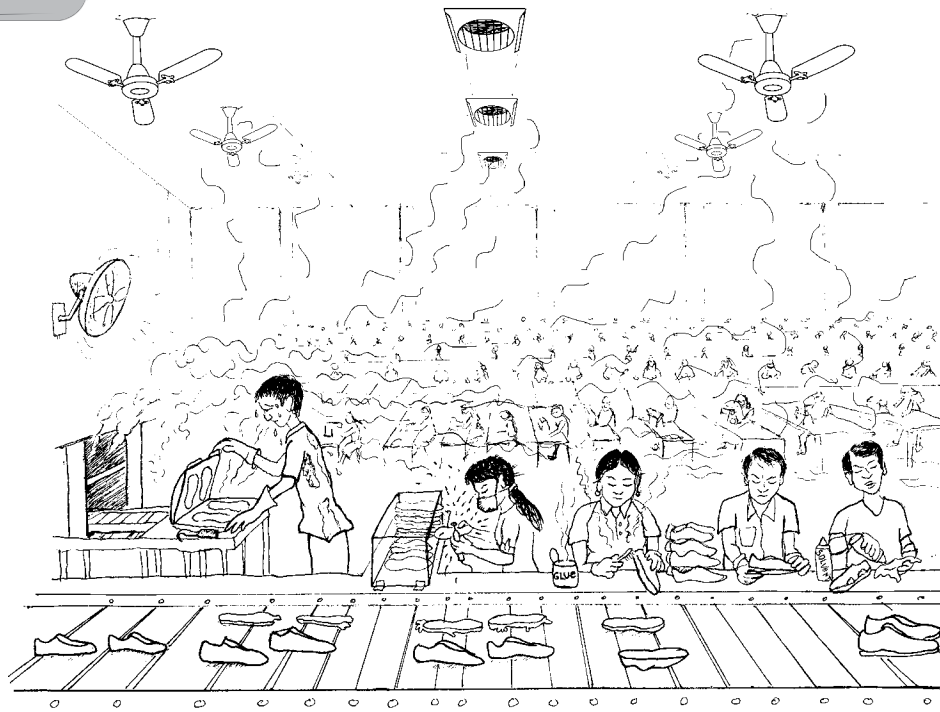


17 Ventilation



All buildings have ventilation — the way air moves in and out. But in many factories, bad ventilation harms workers' health by not moving air containing chemicals, dust, and heat out of the factory.

The factory owner is responsible for protecting you and the air you breathe by:

- making sure all workers have clean, fresh air in the factory.
- reducing the risk of exposure for workers and people in surrounding communities by using fewer chemicals and less of each one, and replacing harmful chemicals with less harmful ones.
- changing tools, machines, chemicals, and work processes so they produce less fumes and less dust (see pages 164 to 172).
- preventing the buildup of chemicals, dust, and heat and safely removing them from the factory.
- keeping the factory at a comfortable temperature (see chapter 15: Heat and cold) and giving workers enough breaks and clean water to drink (see page 414).

Bad ventilation makes you sick

When the ventilation systems in your factory are not working well, chemicals and dusts are likely to get into your body.

If chemicals and dust are in the air you breathe, you probably are exposed to them in other ways, too. Chemicals can be absorbed through the skin or get into your stomach if you touch food or drink, or smoke cigarettes after working with them. You might be exposed to chemicals and dust after you leave work, if the air coming out of the factory is polluted. For more information on how chemicals get in the body and how they can harm you, see chapter 8: Chemical dangers.



Record any health problems in your health notebook. Ask other workers to do the same. Compare notes to find similarities and note special concerns.

Some chemicals and dust can harm the body right away, while others can take a long time to cause health problems. Watch for signs you are exposed to heat, chemicals, or dust in the air.

- **Headaches and tiredness:** Breathing chemicals often causes headaches or dizziness, but these are common problems and can be caused by many things. The same is true of being tired all the time.
- **Problems of the eyes, nose, and throat:** Red and irritated eyes, coughing, sneezing, a runny nose or nose bleeds, or mucus the color of the material you are working with can be signs you are breathing dust or chemicals. These signs may go away when you stop working, but they show one or more chemicals got inside your body and may still cause health problems.
- **Asthma or other chronic lung problems:** Breathing dust or chemicals may cause permanent damage to your lungs, or even cancer or death. Some damage can be managed with medicines. (See pages 97 and 160, and Appendix B: Common chemicals and materials.)
- **Heat exhaustion:** Workers can die from too much heat, especially if they have no time to rest or not enough clean water to drink. (See chapter 15: Heat and cold.)
- **Other health problems:** Breathing chemicals can cause many other health problems, such as damage to the kidneys and liver, and cancer. Babies and young children and the developing baby inside a woman's womb can be harmed more quickly by chemicals. (See Reproductive health problems caused by some chemicals, on page 382, and Appendix B.)

If you cannot breathe or suddenly feel sick, immediately leave the work area and go where you can breathe fresh air (see the First aid box on page 174).

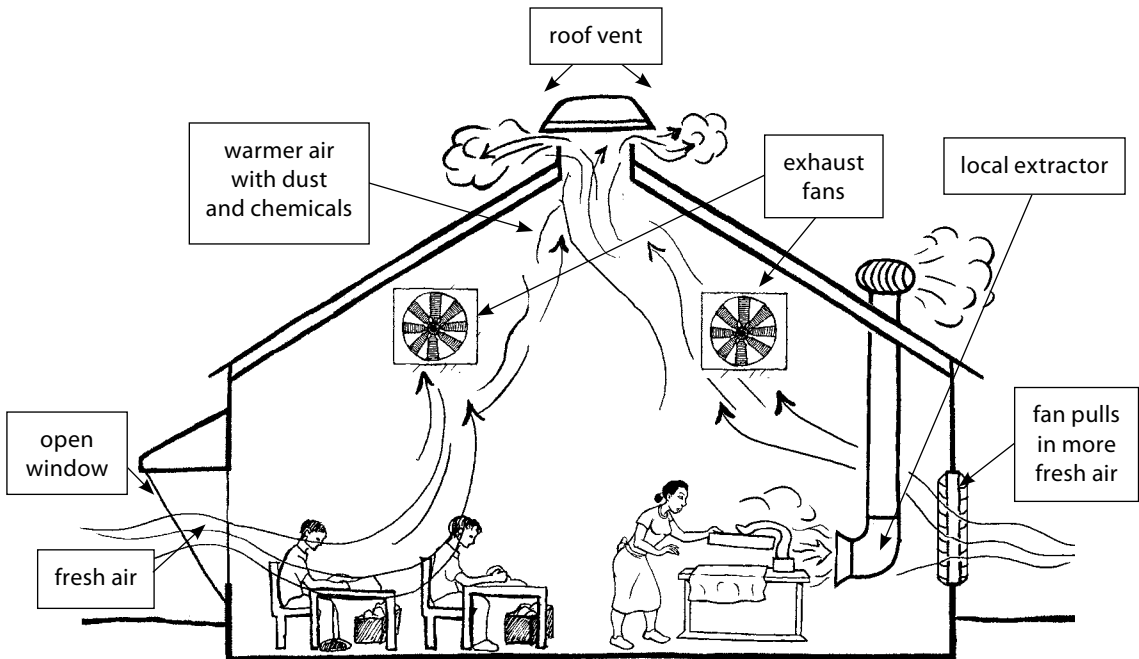
General ventilation

General ventilation helps air move through the factory, reducing the concentration of chemicals in the air.

A good general ventilation system removes some of the dust, heat, and chemicals from the air and replaces it with safe, clean air to breathe. Good ventilation also keeps the temperature and humidity of the workplace at a healthy and comfortable level.

Good ventilation requires regular inspection and cleaning of all vents and filters to keep the system working well and prevent polluting the air outside the factory. This protects people in the community from being made ill from factory pollution.

Heating, Ventilation, and Air Conditioning (called HVAC) is a complex kind of general ventilation system used in electronics factories to better control air flow, temperature, and humidity (see page 249).



A ventilation system can improve air flow and health *inside* a factory. But if the air leaving the factory is not filtered, it hurts the health of the people *outside* the factory.

How general ventilation works

General ventilation should move fresh air into the workplace and move the dirty air coming from the work out.

Fresh air is important because it dilutes the amount of chemicals in the air you breathe so it causes less harm. Do the activity *Follow the air!* on page 253 to see how fresh air moves through your factory.

Windows and fans

Factory windows and doors bring in fresh air but this might not be enough to keep the air flowing and stop people from getting sick from chemicals in the air. Wall fans can move fresh air into the factory or dirty air out, but need to be checked and cleaned regularly to make sure they are working well.

Fans move air through the factory

Directional and ceiling fans help guide air through the factory and can help keep an individual worker cool. If the fans in your factory are not guiding clean air in and dirty air out, they are likely just moving dust and chemicals around in the factory.

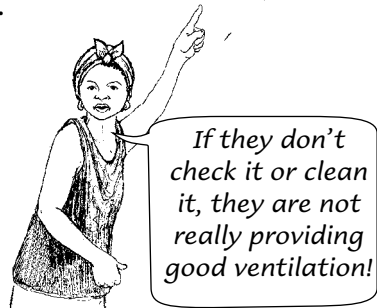
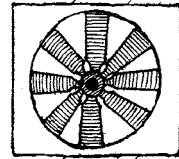
If your factory is hot and fans blow hot air at you, drink lots of water and pay attention to health problems caused by heat.

Vents and exhaust fans move dirty air out

A roof vent lets the warm air out. This creates a draft that pulls fresh air in to replace it.

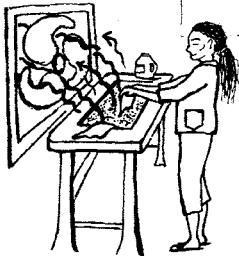
An exhaust fan will only pull air from the area close by and will not help general ventilation. The exhaust vents will not work well or may not work at all if there is not enough fresh air coming in from outside. An exhaust fan that is too weak will not pull out enough dirty air.

Air from local ventilation extractors should be filtered before it is released into the community or back into the factory, so it carries fewer chemicals that may make people sick. When local exhaust ventilation is not filtered, chemicals in the air being removed can cause health problems, especially for pregnant women and young children near the factory. (See chapter 33: *Pollution from factories.*)



Is air flow helping or harming you?

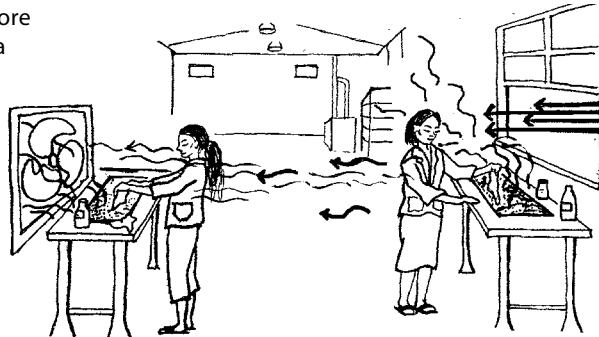
Martina works in a radio assembly factory in Mexico. She cleans plastic parts with a strong solvent in a small workshop. Her station used to be in front of an open window. When air came in through the window toward the exhaust fan behind her, she would breathe in chemical vapors as well as some fresh air. Martina got headaches and sniffled and coughed almost every day.



After a training about ventilation, Martina asked the boss to move her workstation across the room. Her boss agreed because she wasn't asking for anything new, like a local extractor. Now fresh air from the window comes from behind her and pushes the chemical vapors away from her. The exhaust fan is strong enough to pull all the vapors away from her and out of the building. Martina feels a lot better.

After a training about ventilation, Martina asked the boss to move her workstation across the room. Her boss agreed because she wasn't asking for anything new, like a

When the busy season came, more people were hired. Now Martina shares her workspace with Celeste. The boss put Celeste in front of the window, the spot where Martina had worked before. Even though the factory has a strong exhaust fan and a lot of fresh air, the way the air flows through the workshop is now unhealthy. Both Celeste and Martina are breathing chemicals that affect their health.

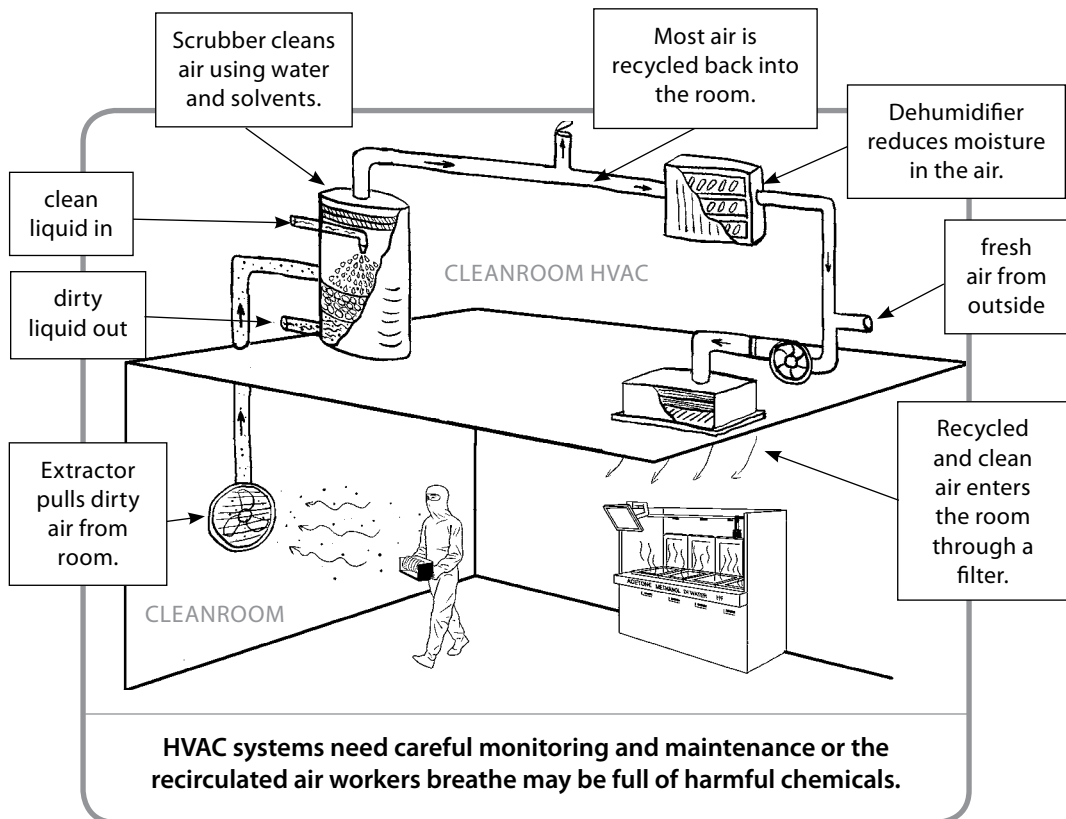


Special general ventilation

Heating, ventilation and air conditioning (HVAC) systems are used in work areas like “cleanrooms” that must be kept at the right humidity and temperature.

To work well, HVAC systems should:

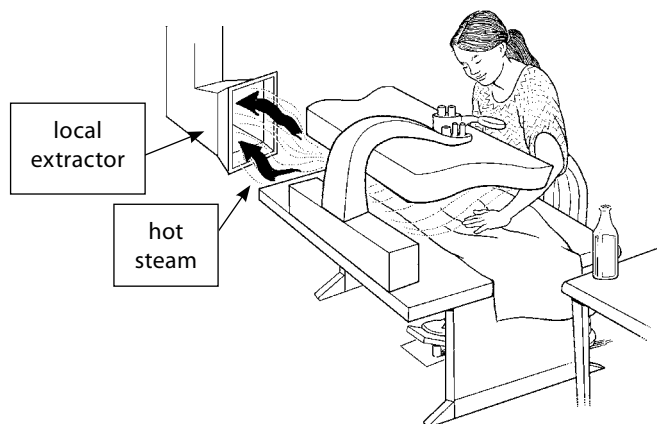
- **balance air in and air out.** If the fans bringing air in are too strong, they overwhelm the vents extracting the air, and not enough dirty air will be removed. Dusts and chemicals will accumulate in the cleanroom.
- **clean and filter the air.** Dirty air, full of dusts and chemicals, is extracted, scrubbed, and filtered. Almost 70% of this air is sent back into the cleanroom after it is cleaned. If scrubbers and filters are not monitored and replaced, they might not remove all chemicals.
- **control the temperature and dampness.** Air conditioning keeps the work area cool and dry to lower the amount of fumes and vapors, and the flammability of the chemicals used in the cleanrooms. The temperature might be too cold. (See chapter 15: Heat and cold.)



Local ventilation

Local ventilation is placed close to the work being done to immediately remove most of the chemical vapors, dust, steam, and heat before they get into the air you breathe.

Local ventilation is sometimes called an extractor, an exhaust vent, or local exhaust ventilation. Local ventilation does not replace general ventilation. To protect workers, both systems need to be working.

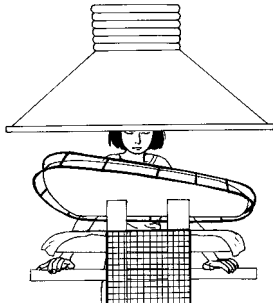


These jobs need local ventilation:

- grinding, sawing, and sanding, because they create large amounts of dust and debris. Workstations with a lot of dust should also be cleaned well with vacuums, wet towels, or sponges to prevent the dust from spreading.
- gluing, soldering, and spot cleaning, because the chemicals used for these release vapors.
- jobs that use mists or sprays, because these move quickly through the air and can be harmful to the lungs.
- jobs that use or produce chemicals or dust that can catch fire or explode.

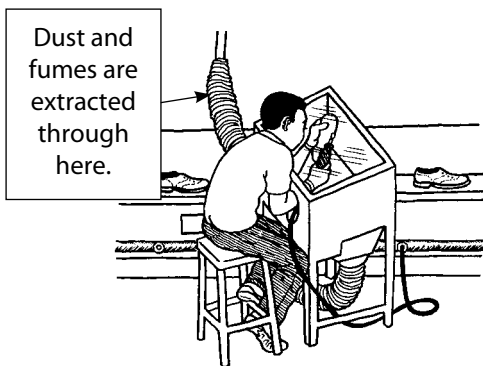
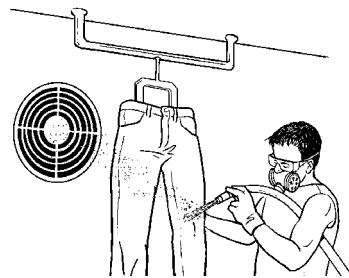
Some work processes should be completely enclosed in a machine to prevent chemicals or dusts that are very dangerous to health from getting in the air. Maintenance workers must be especially careful about exposure to chemicals when they open and repair these machines (see Enclosed machines, on page 169).

Kinds of local ventilation



Extractor hoods are placed above or next to the work area. If hoods are close to the work, they will remove more of the hot and dirty air. If they are too far, some of the fumes might get in the air you breathe. Fans, or people walking by, opening doors or windows, can change the direction of the air. Do the activity Follow the air! on page 253.

Local extractor vents are placed very close to the work or on the tool itself. Vents should be downwind from the work you are doing, so they pull the air away from your face instead of towards it.



Dust and fumes are extracted through here.

Local exhaust booths protect workers by putting a protective barrier between the worker and the work, and then use ventilation to remove most of the dust or fumes from inside the booth. Workers need the right kind of gloves to protect their hands (see Gloves on pages 262 to 265).

All local ventilation systems need regular cleaning and maintenance. Regularly check and replace filters, fans, motors, belts, and gauges. When the filters or air ducts are blocked with dirt, more dust or chemicals stay in the air workers breathe. Filters should be cleaned or disposed of safely.

If the local ventilation is not working or not working well enough to extract all the dust and chemicals being produced at your workstation, you will breathe them in. Demand that the boss fix the ventilation. In the meantime, use masks and gloves to protect yourself from these dangers. (See chapter 18: Personal protective equipment.)

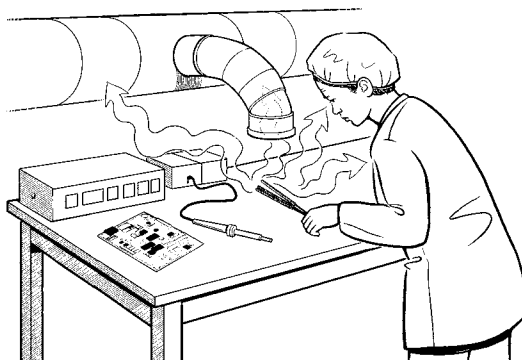
How to

Check your local ventilation

A smoke test is an easy way to see the direction, flow, and power of the fresh air coming into a work area and the dirty air leaving. There are many kinds of smoke testers. Some produce a lot of smoke that can harm your health. Some are as small as a match and produce less smoke, which is safer. Smoke tests can be done with smoke bottles, smoke pens, powder puffers, and smoke matches. (Where ductwork contains smoke detectors, this test will not work.)

If you do not have any of these, use other things that produce a good amount of smoke. Do not use fire around flammable or explosive chemicals, dusts, or processes. Another way to check how the air moves around you is to attach tissue to a stick that will not bend and move it close to the extractor.

1. Use several sticks of incense, cigarettes, cigars, or a bundle of leaves or paper that burns slowly and creates a lot of smoke, like a bundle of sage. If you are working with flammable or explosive chemicals or processes, do not use anything burning. Instead, fill a bottle that has a small nozzle with baby powder that will drift in the air like smoke.
2. Turn on the extractor closest to your workstation.
3. Stand or sit where you do your work.
4. Make smoke. Where does it go? How does it move? Does anything change when people walk by and block the ventilation?
5. If the smoke goes directly to the extractor and all of it goes inside, it is probably working well.
6. If it moves towards your face, towards other workstations, or in other directions, something is probably wrong. Maybe not enough air is coming in, maybe movement around you affects the direction of the smoke, or perhaps the extractor vent is not powerful enough. Have your co-workers do this activity, too.
7. If all the smoke does not go in the extractors, you and your co-workers can pressure your boss to find someone qualified to fix the problem.

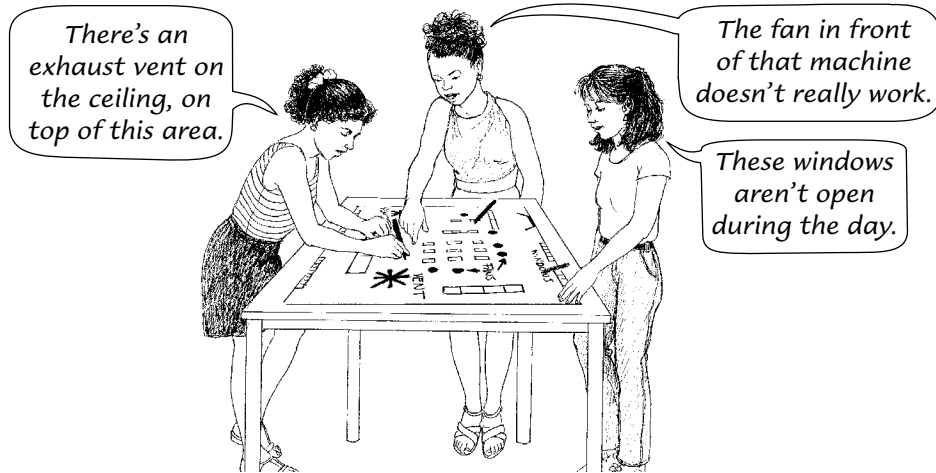


Activity

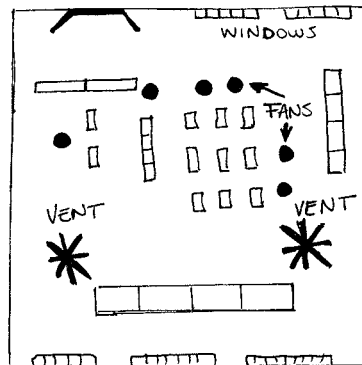
Follow the air!

1. Draw a map of your factory's ventilation

If you work in a large factory or if you work inside cleanrooms, it might be useful to also make a map of your work area.



- **Where does air come in?** Draw every source of air, even if it is “when a door opens and closes.” Do some sources of air bring in more or less air? Is it fresh air from the outside or air from other parts of the factory?
- **Where does the air go and how does it move inside the factory?** Air is hard to track. But try to draw where the air goes after it comes in. Show fans and which way they move air. By making a steady stream of smoke or powder and following it, described in Check your local ventilation on page 252, you can see how air moves in the factory.



- **Where are the vents or extractors that remove the air?** In some factories, windows and doors might be the only way air goes out of the factory.
- **Where are the work areas where people are getting sick?** Areas where there are problems may not have good ventilation. (See Bad ventilation makes you sick, on page 245.)

(continued)

Activity

Follow the air! *(continued)*

2. Inspect the ventilation system in your factory

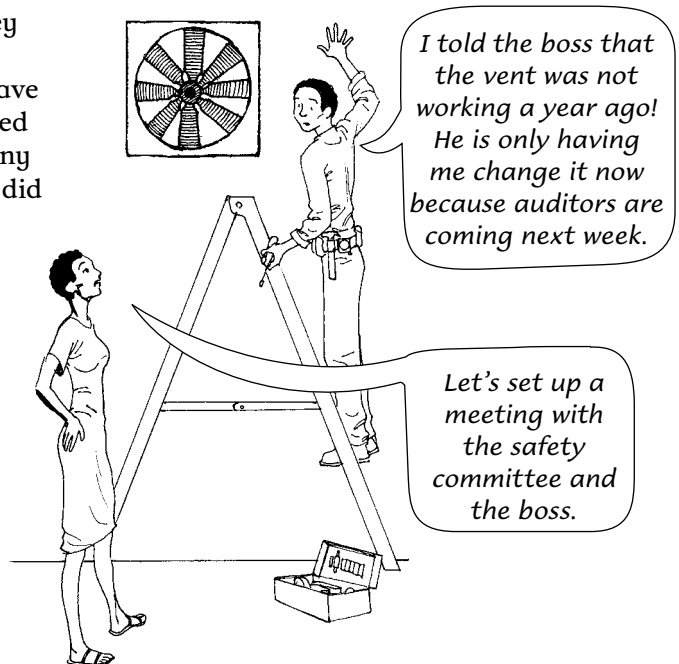
Ask maintenance workers for help. They can tell you about the ventilation system or take (or let you take) photos of it. Work with them to understand how poor ventilation harms their health too, and let them know you are not blaming them for any problems.

3. Find out how the ventilation system is maintained

Fans, extractors, and vents get dirty and can break. Cleaning, inspecting, and replacing blocked or broken fans, vents, and extractors should be included in a good ventilation plan.

- **Are they cleaned?** Ask maintenance workers if they know who cleans them and how often. They may also have filters that need to be cleaned or replaced. Do they have any record of the last time they did this? Also ask about what they use to clean them.
- **Who checks them and how often?**
- **How quickly are parts or units replaced if they are broken?**

Is there anything blocking the air coming in or going out of vents?
How dusty are the vents?
Can you see or smell dust or chemicals?
Is there anything outside the factory blocking air from coming in or going out?
Is the ventilation system on all the time, or just sometimes?
Are fans and extractors strong enough?



The right to healthy air at work



The **ILO Working Environment (Air Pollution, Noise, and Vibration) Convention (No. 148)** says employers are responsible for:

- designing workplaces and installing systems to reduce air pollution.
- changing how work is done to reduce air pollution.
- providing and maintaining personal protective equipment, and ensuring it fits workers, if it is not possible to reduce all of the air pollution.
- providing a baseline medical examination for workers when they start work, as well as regular examinations free of cost to the worker.
- finding suitable alternative employment if the medical examination finds the job harmful to a worker's health.

The **Working Environment Convention** also says workers can:

- receive training and information about air pollution and protection from it.
- receive medical examinations.
- present proposals to improve ventilation without fear of retaliation.
- inform government officials of processes, substances, machines, and equipment that cause air pollution and expect they will encourage the employer to repair, improve, or replace them.

The **ILO Protection of Workers' Health Recommendation (No. 97)** says that employers should ensure:

- workers have safe and sufficient air.
- air temperature and humidity is comfortable in the workplace.
- frequent testing of work areas where dangerous chemicals are used.

The roles of the UN, ILO, and other international organizations that promote workers' rights are explained in Appendix A.

Better ventilation improves everyone's health

Workers are not the only ones who are healthier when they can breathe air free of chemicals and dust. The well-being of their families, communities, and even factory management depends on them staying healthy.

Some changes to ventilation systems are very easy to make and maintain. Some cost more. You may also come up with other ideas to improve ventilation that might not require the boss to be involved.

Form a workers' ventilation committee

Invite your co-workers to build a team of workers that can focus on ventilation problems. Anybody can join the team, because every person in the factory will benefit from better ventilation.



Find out what ventilation issues there are in your factory through surveys, inspections, and mapping activities (see chapter 3: Organizing to improve worker health). Share any information you gather with all workers.

Seek support from people who know about ventilation, such as maintenance workers, ventilation installers, health organization staff, occupational safety and health professionals, and others.

Reach out to your co-workers, supervisors, and the boss.

Ventilation requires constant attention. Getting an extractor may be a great step forward, but it will not protect your health if it is not regularly checked and cleaned. Keep pushing for monitoring, testing, maintenance, cleaning, as well as worker involvement at every step.



The boss gave us masks and said, "Now you are protected." He refused to make any changes to the ventilation until we complained to the company that buys from him.

Think of ways to improve ventilation while workers organize to win bigger changes. For example, moving workstations to improve air flow while demanding that the boss install extractors. When discussing what changes to make, make sure to include all workers.

Talk with people in unions, worker centers, and NGOs to learn about how others have campaigned for better ventilation (what worked or did not work), to get help reviewing information you have collected, and for advice on how to improve your workplace.

Reach out to government officials and learn about laws about ventilation in your country, and research the ways in which you can push to enforce them. If your current laws are weak or leave ventilation regulation to the companies, seek support from legal clinics and organizations about how to influence or change laws. See if you can find support in international conventions (see Appendix A: Laws and the struggle for decent, healthy work) or the "Codes of Conduct" for the brands being made in your factory.

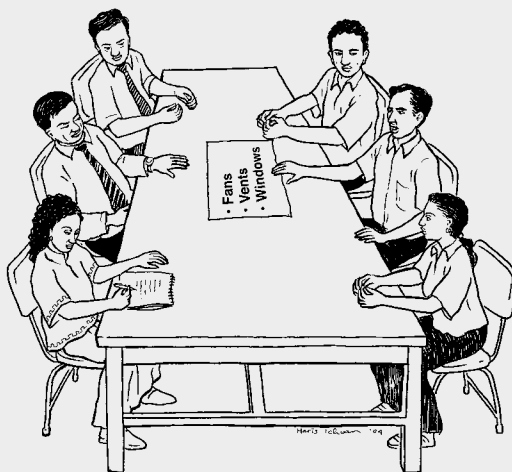
Talk with community groups working against air pollution in your community. The polluted air extracted from the factory can affect the health of everybody inside and outside the factory. Join campaigns to reduce and prevent air pollution and increase pressure on government officials to monitor and regulate ventilation in the factory.

A cooler factory

The Ocean Sky factory in El Salvador got very hot in the middle of the day. Managers always locked the doors and windows to “reduce theft” so no fresh air could come in. Workers would sweat right onto the clothing they were making for Puma and Adidas.

But ventilation was not the only problem at Ocean Sky. When workers got together to talk about the things that needed to change, they realized there were so many! With the help of several unions, the women’s group *Mujeres Transformando*, and international organizations, they decided to fight for all of them at once.

To create a good ventilation proposal, workers collected research and involved experts and the government. When the government official came to test the temperature at the factory, he was shocked at how high it was. The official told the boss he needed to open windows and doors, install extractor fans, and place cooling fans around the factory. By now the united effort with unions and NGOs had gotten the attention of the brands that gave the factory contracts. They pressured the boss to make these changes.



A few months later, another organization came to check on the changes. All the windows were open, but the air flow was still bad. Shelving units blocked air flow through the factory. The boss moved them to a better place.

Now workers do not sweat as much as before, but many still have allergies and breathing problems. They are discussing how to get the boss to install local extractors for the machines that produce dust.