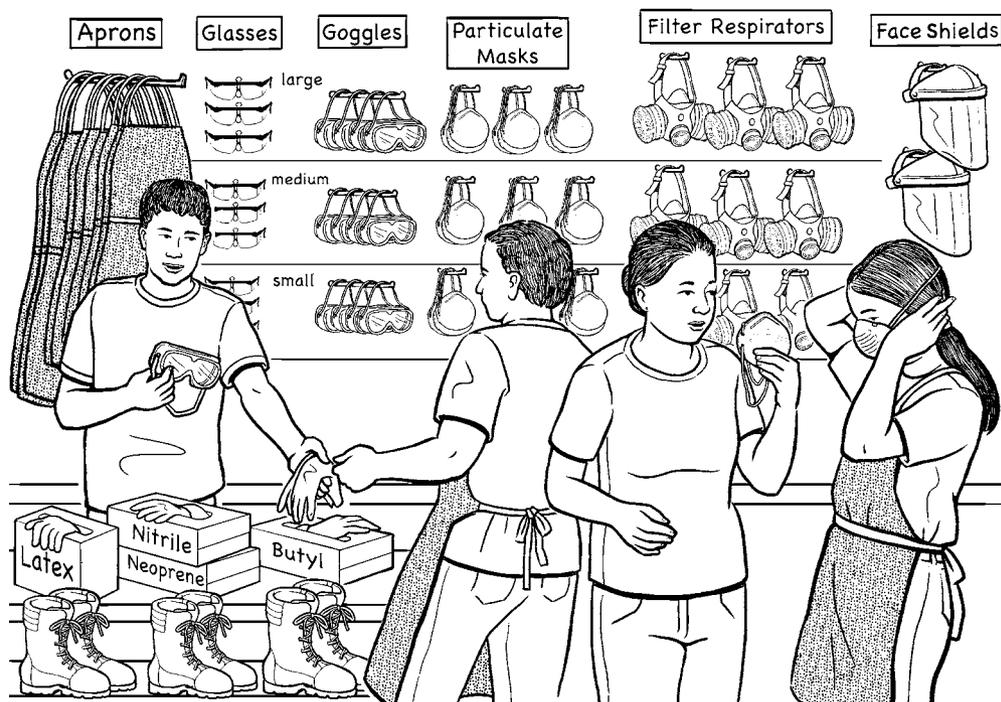


Personal protective equipment (PPE)

18

When workers complain about dangerous materials and chemicals, the boss may tell them, “Wear these gloves. They will protect you.” When personal protective equipment (PPE) is part of a system of preventative measures (see page 9), it can help protect workers from getting sick or injured from work. But PPE should never be the first or main form of protection. The general rule, “Change the workplace, not the worker,” puts the responsibility on the employer, where it belongs, and usually provides more and better protection. For example, replace a dangerous chemical with a safer one, enclose a machine to limit noise or vibration, or improve ventilation in the factory. It can also cost less over time for management to eliminate dangers than to provide protective equipment.

PPE may provide extra protection for an individual worker, but it should not be a substitute for changes that protect all workers.



One size does not fit all

Personal protective equipment is “personal.” To protect you, PPE has to:

- fit you correctly and be tested for fit.
- be different for women and for men (their bodies are different).
- be clean if it is PPE you reuse, or new if it is PPE you use only one time.
- be in good condition, with no holes, cracks, or ripped in any way.
- be the right kind for the danger you face.
- be replaced regularly and at any time it no longer works.
- be used as a last resort after other, safer, controls are in place.

PPE must also be comfortable enough to use all the time. Gloves that make it difficult to move your fingers, masks that are hot, glasses that are scratched or fog up — these may make it harder to work, make you work slower, and, if not well-chosen for the job, create problems such as heat stress and heart strain.

Do not let these difficulties lead you to work without the equipment you need to stay healthy. Instead of listening to the boss blame you for not wanting to protect yourself, organize to get the boss to provide better PPE, adjust piecework rates, or slow the speed of the line if necessary. Even if you feel you are strong or tough enough to work without PPE, it is better to protect your health than to risk it.

Finally, do not let PPE make you think you are protected when you are not. Wearing PPE does not mean you are safe. The only way to make sure you are protected is to fight for safer chemicals, safer conditions, and safer production schedules for everyone in your workplace.



The boss hired a specialist to train us to use new PPE. He showed us how to put it on and take it off, and how to clean and store it. But he never asked us how the PPE felt. Wearing it was hot and uncomfortable, and it made it difficult to do the job as quickly as the supervisor wanted us to do it. Some people stopped using the PPE right away. When the boss saw people working without PPE he didn't ask why we didn't wear it, he just said that if we got hurt it would be our own fault. When one of the workers was working without goggles, a hose on a machine broke, squirted solvent into his eye and he had to go to the hospital. Even then, he lost vision in that eye. The company refused to pay him compensation because he wasn't wearing PPE. That's not fair.

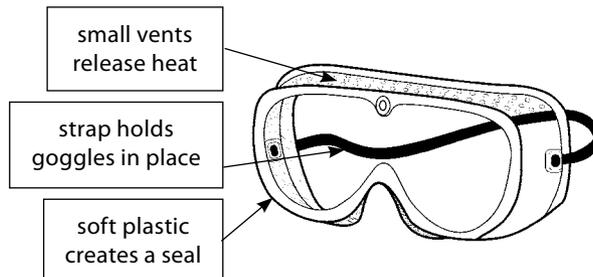
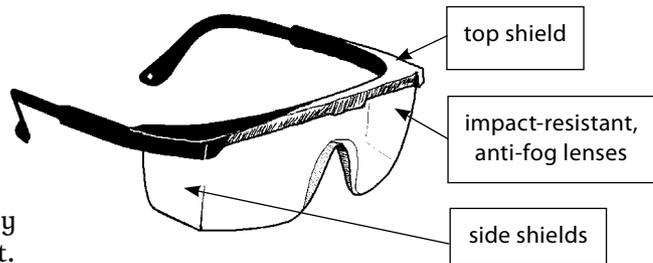
Eye protection

Your eyes can be quickly and permanently damaged by chemicals, dust, bright lights, or sharp objects. Safety glasses, goggles, and face shields provide some protection. If a chemical or dust gets in your eye, immediately rinse it with running water for at least 15 minutes. See First aid on page 175.

If you work in an area that uses UV lights or radiation, use safety glasses, goggles, or face shields that filter out UV rays.

Do not wear contact lenses if you might be splashed with a chemical, if chemical vapors are common where you work, or if you do not have safety glasses. Contact lenses can keep a chemical on your eye longer and the material they are made of may react to some chemicals. Always wear eye protection if you use contact lenses, even when working in areas where there are no chemicals.

Safety glasses: Safety glasses provide some protection from splashes and some objects. Regular glasses that you use to see better will not protect your eyes like safety glasses do. Safety glasses with side shields are best.



Goggles: Wear chemical-resistant, vented goggles if you work with acids, alkalis, and other chemicals that can quickly burn, or in areas where chemicals are sprayed. Goggles provide more protection than safety glasses because they make a more complete barrier around your eyes.

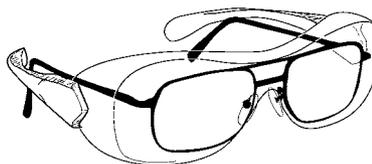
Face shields: A clear face shield can protect your mouth, eyes, and face from many splashes. This type of shield is easy to take on and off, and is easy to clean. Even though it covers your mouth, a face shield does not stop chemical vapors from going into your nose and mouth. If there are chemical vapors, wear a mask or respirator (see pages 266 to 270).

Wear chemical goggles or safety glasses underneath a face shield. You really need both.



When you use eye protection:

- Check that it is not broken, cracked, or scratched.
- Make sure it fits snugly, comfortably, and won't fall off as you work.
- Get a new pair if yours are so scratched or dirty you cannot see well through them.
- Safety glasses or goggles must fit over your vision glasses comfortably, or you can get special prescription safety glasses.
- Disinfect shared eye wear after each use.
- If you are working with corrosive chemicals such as acids, make sure your eye protection resists those chemicals.



Gloves

After our brains, our hands are the most important tools in the factory. Gloves help protect them from materials, heat, tools, and machines.

Gloves that protect from chemicals

If you apply chemicals, work with containers of chemicals, or touch, carry, or move materials that contain chemicals, you need protective gloves to prevent chemicals from irritating and burning your skin and getting inside your body. Some gloves are thrown away after every use (“disposable gloves”) and some are used more than once (“reusable gloves”).



Look at the box to find out the kind of gloves and the chemicals they protect you from. The wrong gloves might absorb chemicals and hold them against your skin, making problems worse.

There are many kinds of chemical-resistant gloves, but no one glove can protect you against all chemicals. If you are working with more than one chemical, use a glove that provides protection from the most dangerous chemical or the one you are most likely to come in contact with.

Wear 2 gloves on each hand if you might be splashed with hydrofluoric acid (HF) or if you are working with a very harmful chemical. If the 2 pairs of gloves are different colors, it will be easier to see if the outer one rips. Change the outer glove as needed. If you work with large amounts of HF, use a heavy nitrile glove outside and a thinner one inside. Also wear 2 pairs of gloves if you work with nanoparticles.

If you work with machines, wear gloves that cannot catch in moving parts.

Disposable gloves

Natural rubber (latex) gloves are the most common. They can protect you from mild chemicals. They are cheap, flexible, and easy to use. They also provide some protection from heat and irritation, or injury from rough surfaces. If you are allergic to latex gloves, use nitrile gloves.

Neoprene gloves can protect you from alcohols and some acids. They are also good protection for glycol ethers found in cleaners. They are very flexible and are commonly used instead of latex gloves.

Nitrile gloves are a good general glove. They protect you from some solvents, acids, and bases, but not from solvents such as benzene or methylene chloride. They are flexible and can be used for doing very precise work. When they are damaged, they rip open, so it is easy to know if it is time to throw them away.

Butyl gloves can protect you against some strong acids and some solvents (alcohols, ketones, esters), but do not protect you against other solvents such as aromatic hydrocarbons or halogenated hydrocarbons. They offer some protection against gases. They are flexible even when cold.

Reusable gloves

Thick gloves will protect more against chemical spills but they are not good to do very precise work because they prevent your fingers from moving as easily as with a disposable glove.

If you are working with a lot of chemicals, a chemical that can burn you quickly (such as an acid), or one that is very harmful, wear a thicker glove on the outside and a thinner glove on the inside for extra protection.

Norfoil gloves can be used to protect workers from many dangerous chemicals. They can be loose and big, making it harder for you to use your fingers to do precise work.

Viton gloves are used to protect workers from chlorinated and aromatic solvents and can resist some cuts.

Polyvinyl chloride (PVC) gloves are used for protection from strong acids, bases, and alcohols. They **do not** protect you from most solvents.

Polyvinyl alcohol gloves are used for protection from aromatic and chlorinated solvents, such as methylene chloride and toluene, but are not a good choice for water-based solvents.



Discard used gloves as dangerous waste.

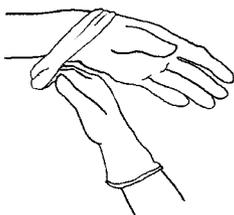


Some glove material is not stretchy and does not mold to your fingers.

You can make thick gloves fit better by putting a tight nitrile glove over them.

When you wear gloves that protect against chemicals:

- Look and check all gloves for rips or holes before you use them. Some holes might be too small to see. For reusable gloves: Fill them with air by holding the opening and flipping the glove over itself quickly and closing off the opening. If you feel or hear air, there is a hole. Get a new pair. Use scissors to cut off the fingers so no one else will use them.
- If a chemical spills or splashes on them, rinse and remove them and safely dispose of them. Get a new pair.
- Use a new pair if the gloves are stiff or have changed color.
- Remove them before touching phones, doorknobs, shared objects, food, or anything you put in your mouth.
- Wear a thin glove inside a reusable glove for more protection. A washable cotton glove liner can reduce problems from sweating.



To take them off:

Use your gloved finger to roll the glove off the other hand so it is inside out. Then use the inside-out glove to remove the other one. Make sure your bare skin does not touch the outside of either glove.

We demand gloves!

My hands were red after the first day of working with an automatic ironing machine. When I asked my supervisor for gloves, he refused. So, I brought my own canvas gloves. When the other women saw my hands got better right away, they started using gloves, too.

But the gloves were too big. One day, my glove got stuck on the iron, trapping my hand. My co-workers turned the iron off before it crushed my hand. The boss said we couldn't wear gloves because they were "unsafe."

Without gloves, our hands got red again. We were angry. We decided to turn the machines off and yelled at the supervisor, "The cloth makes our skin red. We won't work until you give us gloves." He had a big order to fill, so he agreed to buy us gloves. Now we have to get him to buy gloves that are different sizes, to fit women with smaller hands.

Allergies to latex gloves

Some people are allergic to latex gloves and cannot wear them. A rash is usually the first sign that you might be allergic to latex, but pay attention to any signs that appear when you wear latex gloves. Report a rash to your employer right away and stop using the gloves. If the rash does not improve in a few days, the cause might be something else.



The rash can appear in any part of the hand and fingers.

The next time you wear latex, the allergic reaction can be the same or worse. Your allergic reaction could include problems breathing, or even going into shock. If you have an allergic reaction, remove the gloves and immediately stop using latex gloves. Tell your boss you need nitrile gloves instead. To protect you and others with latex allergies, it is best to have all the workers switch to a non-latex glove.

If you must use latex gloves:

- Use “powder-free” ones, with no talc inside.
- Wash your hands with mild soap as soon as you take them off.
- Use water-based lotions on your hands after washing them.
- Remove the dust that comes inside the gloves.

The risk of an allergic reaction is less when other workers help reduce the spread of latex powder.



Health
Info

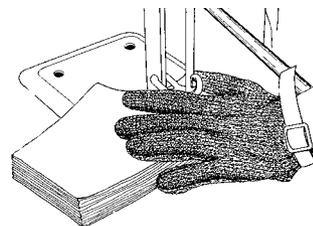
Gloves that protect against cuts and heat

Gloves made from leather, metal mesh, or canvas can protect you from some cuts and heat. They may not protect you from needles or other objects that can pierce the skin. They will not protect you from cuts from large power tools. If you also work with chemicals, use a chemical-resistant glove under your cut-resistant gloves.

Fabric gloves coated with plastic might protect against some chemicals. Fabric gloves made with aluminum thread protect against heat and cold, cuts, and some diluted acids.

Leather gloves protect against some cuts, heat, and sparks.

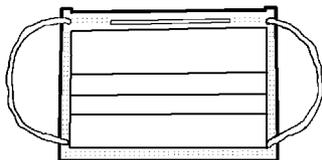
Metal mesh gloves can protect against some cuts from cutting tools.



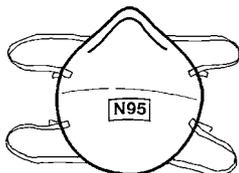
Always use metal mesh gloves in the cutting area.

Masks and respirators

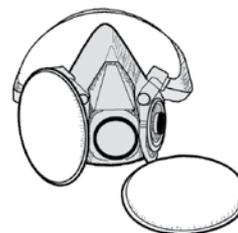
A mask or respirator can provide some protection from dust, germs, fumes, mists, and chemicals in the air if it fits you well and is the right kind for the dangers of your job and workplace.



Loose masks only protect you from germs. They do not protect from dust or chemicals.



Particulate masks protect you from some dusts. They do not protect you from chemical vapors or very small dust.



Respirators with filters protect you from chemicals and dusts only if they use the correct filters for those substances.

If you have asthma or other breathing problems, it might be difficult to breathe using a mask or respirator. If one is required, ask to be moved to a different job. If your boss will not make changes, let your co-workers know you have breathing problems and tell them what they need to do in case you have difficulty breathing. The factory should have doctors examine all workers who use respirators to make sure they are healthy enough to do the work.

Some dusts are more dangerous than others. Cotton dust can cause byssinosis (see page 97), silica in sandblasting can cause silicosis (see pages 101 to 103) and lung cancer, and asbestos dust can cause severe lung problems and cancer. Wear a respirator with a HEPA filter (High-Efficiency Particulate Air), labeled N-100, if you work where there is very fine or small dust. A HEPA filter can filter almost 100% of the particulates and is the best for small particulates. The finest dusts are the least visible — and the most dangerous.

When you wear a mask or respirator because there is enough dust or chemicals in the air to harm you, also wear gloves, eye protection, and protective clothing to protect your skin and eyes.

Loose cloth or paper masks

Loose-fitting masks offer very little protection from dust and do not protect from chemical vapors. Since they do not seal around your face and mouth, they let dust in.

Chemical vapors pass right through the paper or cloth. Only masks with filters will protect you from breathing in chemicals (see page 268).



Make sure your mask covers both your nose and mouth.

How to

Make a cloth mask for dust

Instead of covering your face with a cloth that lets dust in through the bottom...



...make a mask that fits more closely over your nose and mouth.



1. Cut 2 strips of cotton fabric about 10 to 12 cm wide and long enough that you can tie them around your head comfortably. Stitch the edges, or at least take all the threads off the ends.
2. Place the center of one of the strips on top of your nose. Tie the ends behind your head.
3. Then put the center of the other strip over your mouth and tie the ends behind your head. Make sure the edge of the cloth on top of your nose is underneath the seam of the one covering the mouth.

You can make a more permanent mask by sewing the pieces together. Or make many! Wash the mask by itself, not with other clothes.

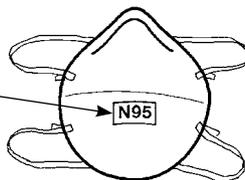
Dust mask

Tight-fitting paper or plastic masks, also called “particulate masks,” catch dust and germs but they do not protect you from breathing many chemical vapors or very fine dust.

Different kinds of particulate masks are categorized with numbers and letters. The higher the number, the more particulates the mask will filter. Standard particulate masks often look the same so find out their number and what they are good for. These often clog quickly and cannot be used more than one day.



The “95” means that this mask filters out 95% of particles.



Check the mask and its box or bag to make sure the mask is the right kind for the substance you are working with.

Respirators with filters

Also called rubber masks or masks with filters, respirators have filters that prevent some of the chemicals or dusts in the air from getting into your lungs.

Respirators protect you when:

- they fit you well.
- they have the right filters for the chemicals you and others are using in your workplace.
- the filters are replaced when necessary.

Respirators can cover the nose and mouth or the entire face. If they are too large or too small and do not make a seal against your skin, you will be breathing air that is not filtered, which can harm you.

The filters stop certain chemicals and substances from passing into your lungs. After a certain amount of time (see the box or instructions), filters are used up and no longer work. Your factory should have a system for cleaning and changing the filters regularly, before they stop protecting you. Changing filters also makes it easier to breathe using the respirator. Read the box to know how long the filter should be used and to be sure it is the right one to use in your brand of respirator.

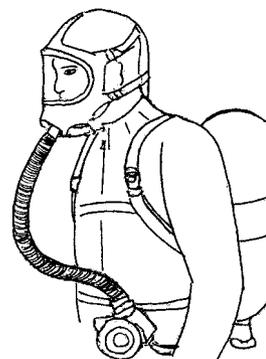
Countries have different laws regarding the use of respirators. Look at the label and Safety Data Sheets (SDS) of the chemical and seek support from health officials, unions or other organizations to get this information. Also find more information in Appendix B: Common chemicals and materials.

Respirators with their own air supply

These masks have tanks of air so the person does not breathe outside air at all. These respirators fit more loosely, but they cover the entire head. Respirators with their own air supply are used when there is no other way to reduce the exposure, such as a chemical spill or accident. They might be necessary for maintenance workers opening or entering machines, or when the chemicals in the air are likely to harm you. They can be heavy and make work more tiring.



Respirators can have 2 filters on the sides or one in the center, and can cover parts or all of your face.



Respirators with supplied air need careful cleaning after every use.

How to

Check that your respirator fits and works

Look at it. Move and touch all the parts to make sure they are put together correctly and there are no holes, cracks, or damage.

Try it on. Make sure it fits. Turn your head from side to side and up and down. Check that it does not bump against your shoulder or chest. Speak for 30 seconds to see if moving your jaw and lips changes the fit. Facial hair (mustaches, sideburns, or beards) might not fit in the mask or might not let the mask seal around your nose and mouth. If you will wear goggles or other eye wear, they must fit well when you wear your respirator.

Breathe normally first and then take a deep breath. Can you smell or taste the chemical you are working with? If you can, then it is not working properly. However, some chemicals do not have a smell or you might not be able to smell them. Try to test your mask around chemicals you can normally smell.

Check the seal. Test the respirator every time you put it on. Even if the respirator fits well one day, it might not the next. Always take the time to test the fit of any respirator you wear.

You can check the seal in 2 ways:

The first way is to do a “**negative**” pressure test by trying to pull air into the respirator. If no air from the outside comes in, it means the seal is probably good. To do this test, put the respirator on. Put your palm or a cover on top of all the entry points of air from the outside to close them. Take a breath and hold it for a few seconds. The respirator should tighten around your face, and collapse in a little. If it stays like this during the time you hold your breath it is probably sealing well.



The second way is to do a “**positive**” pressure test, where you add air to the respirator. If no air escapes, it means the seal is probably good. Cover the exhale valve and breathe out inside the respirator. If the air stays inside the respirator, it is probably a good seal. Use the positive test only when the exhale valve is small enough that one finger or your palm will cover the valve completely.

(continued)

How to Check that your respirator fits and works *(continued)*

Clean it. After using it, remove filters and other parts and clean the respirator with mild soap and water. Rinse well with water and mild soap. Any residue left might irritate your skin later. Let it air dry. If you do not have soap, you can also use a cloth with a very small amount of IPA to clean it. IPA might damage the rubber over time, so do not use IPA often.

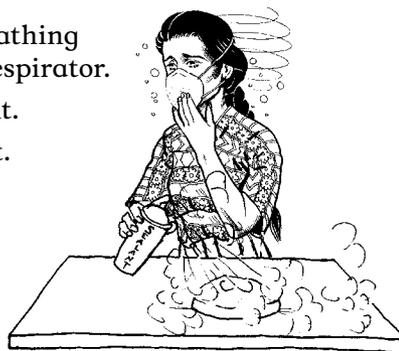
Protect it. Put the respirator in a bag and store it where it will not be stepped on, crushed, or get dirty.

Replace filters often. Filters may last for a few minutes or a few days, depending on how much chemical is in the air where they are used. Maintenance and other workers exposed to high amounts of chemicals need to replace the filters more often than workers doing other kinds of work. Replace straps, valves, or anything else that does not work properly.

Pay attention to your health. Notice any changes in your health that might be a sign that your respirator is not protecting you.

- You have difficulty breathing or your breathing problems are worse when you wear the respirator.
- You smell or taste chemicals while using it.
- You find dust or chemical residue inside it.
- You feel effects from chemicals while wearing it.
- You feel sick during or after work with signs of problems that come from chemicals in your work area.

Let your employer know immediately if your respirator is not working well or if you have signs of exposure to chemicals.



Wear PPE that keeps chemicals off of and out of your body.

Protect your hearing

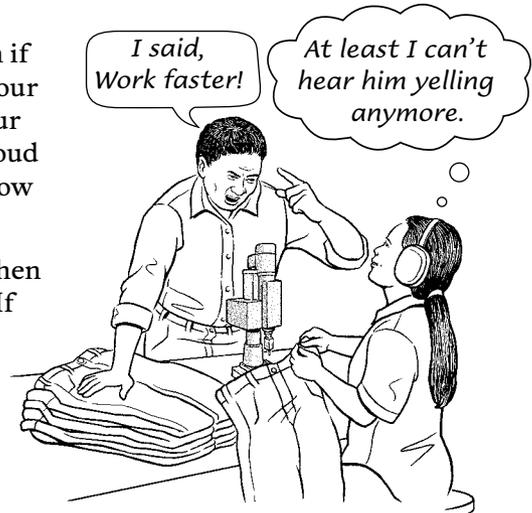
Loud or constant noise can harm your hearing permanently. It can also prevent you from hearing other people, raise your blood pressure, and cause stress. The best way to protect workers is to lower the noise levels. (See chapter 13: Noise for more information.)

Earmuffs

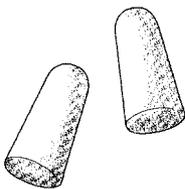


Earmuffs give good protection if they gently but firmly touch your head and completely cover your ears. They are best for really loud noise or for sounds with very low frequency.

Clean earmuffs often and replace them when they no longer fit snugly and keep out noise. If you cannot maintain a good seal because you wear glasses, have long hair or sideburns, or because the earmuffs move when you talk or chew, it might be better to use earplugs.



Earplugs



Earplugs are made from cotton dipped in wax, rubber, or foam. Earplugs can protect your hearing if they are the right size for your ear and are properly inserted in your ears. They should be small enough to fit comfortably and expand to fill the entry into the ear. Most foam earplugs are inexpensive and are made to be used only 1 time.

If you reuse earplugs, make sure they return to their original shape after you pinch them. If they do not expand to fill your ear, they will not protect you. Molded earplugs can be reused. Clean them after every use with soap and water or alcohol. Let them dry completely before using them again.

Plain cotton or cloth earplugs do not protect you well from noise. If you do not have access to rubber or foam earplugs, you can make better cotton ones by dipping them in petroleum jelly. Make new ones each day because reusing them might cause an ear infection.

For some kinds of noise, you might have to use both earplugs and earmuffs.

How to

Insert earplugs so they work

To block noise and protect your hearing, earplugs need to get into the right part of your ear. To make sure earplugs fit well:

1. **Clean your hands and the plugs** when you insert the plugs. This will help prevent ear infections.
2. **Roll the plug between your fingers** to make a long, thin cylinder.



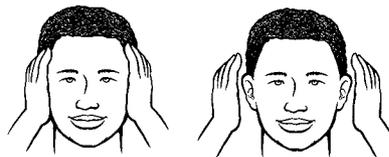
3. **Open the ear.** To put the plug in your left ear, hold the rolled plug in the fingers of your right hand. Reach your right arm over the top of your head and grab the top of your left ear. Gently pull your ear up and back a little. This opens up your ear canal to make it easier to fit the plug in.



4. **Insert and hold the plug.** Insert the narrow tip of the rolled plug into your ear canal as far as it will go. Press the earplug gently into your ear and hold it there with the tip of your finger while it expands to fill your ear canal. This takes about 30 seconds. You should feel the foam expanding to fill your ear and notice noises become much quieter.



5. **Check the fit.** Cup your hands over your plugged ears and notice how loud noises are. Remove your hands from over your ears and notice how loud noises are. If they sound about the same, the plugs fit your ears. If the noise is louder when you remove your hands, then the plugs do not fit your ears well and you need to pull them out and try to put them in again. If you still cannot make them fit well, they may be the wrong size for your ears or the foam may be too worn to work well.

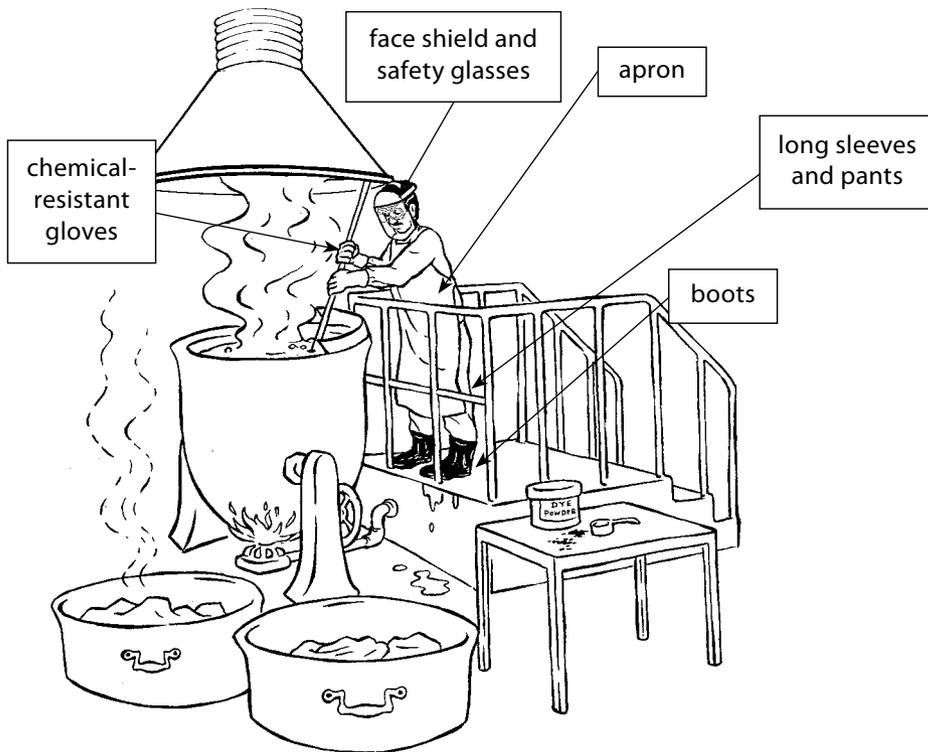


Clothing and shoes

Cloth or plastic protection over your clothing can protect your skin and clothes from some dusts and chemicals. Chemical-resistant clothing, such as aprons, suits, and boots, are necessary if you work with dangerous chemicals, especially acids. These chemicals can hurt you quickly and permanently.

Coats, aprons, and suits

Coveralls on top of your clothes will protect your skin and clothing from dust and splashes. But protective clothing, such as rubber aprons, long sleeves, and other PPE, can make you feel very hot, especially if your workplace is hot. Drink lots of water, take breaks, and pay attention to signs of heat stress (see page 233). Keeping the factory cooler will help reduce heat stress.



Cotton cloth coats and aprons will not protect you from many chemicals, but they can provide a barrier from dusts and small splashes from mild chemicals. They might give you some protection from sharp or rough materials. They should be washed in the factory. If you take them home to wash, wash them separately from your clothes.

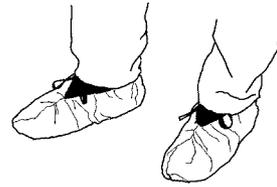
Many body suits are made with a material that is thin and looks and feels like paper. They are meant to be worn only one time. Body suits used in cleanrooms, also called “bunny suits,” protect the product, not the worker (see page 65). They do not offer real protection from chemicals.

Chemical-resistant clothing is made from rubber, neoprene, or other plastic. These protect you from chemical splashes when they are the right kind for the chemical you are working with. If you work with corrosive chemicals, wear chemical-resistant protective clothing.

Closed-toe shoes and boots protect your feet better than sandals. If you wear sandals, wear ones with straps so they do not easily come off. A sturdy sole with some texture will not slip as easily as one that is smooth.



Shoe covers or strap-on protectors are often made of a plastic or paper-like material. They may prevent dust and dirt from coming into the work area but provide only a little protection to you. If they cover the whole shoe and you throw them away after using them, they may prevent you bringing home dusts and chemicals on your shoes.

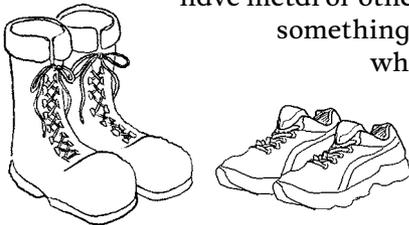


Most disposable shoe covers are slippery. Ask your employer for non-skid shoe covers that have texture on the bottom.

Safety shoes are made of leather or a heavy material that will not melt. Wear safety shoes if you work in an area where things might fall on your feet. They might need chemical-resistant or strong soles that will not slip, and

have metal or other material in the toe area to protect against something heavy dropping on it. If you work in an area where electrical static is common, shoes that

conduct electricity will prevent you from making sparks while walking. However, if you might be exposed to electrical dangers (see chapter 10), you should not wear shoes that conduct electricity.



Shoes with laces or other closures are better than slip-ons.

Heavy plastic boots protect you best in areas where chemicals splash.

When you wear safety shoes and boots:

- Make sure they fit you well. Your toes should be comfortable without too much space. If you trip when you wear them, they are not the right size.
- Look for tears, cracks or holes, or any area where the shoe might be breaking or coming apart.
- Check the bottom of the shoe every day to make sure there are no metal or objects stuck on it.
- Wear long pants over boots and shoes so chemicals do not get on your legs or in your boots.
- Keep safety shoes at work or wear shoe protectors so you do not bring dust or chemicals home with you.



If you wear plastic boots, wash your socks and feet every day to prevent fungal infections. If your feet itch, air your feet as often as you can and use a foot powder.



The right to personal protective equipment at work



The **ILO Occupational Safety and Health Convention (No. 155)** says employers must:

- Protect workers from dangers at work by designing the workplace better, testing dangers regularly, choosing safer materials and systems, and installing and maintaining ventilation to reduce harm to workers.
- Reduce dangers at work.
- Provide workers with adequate protective clothing and safety equipment after all the other systems of protection are in place.
- Provide workers with training and instruction for proper use of the equipment.
- Provide first aid for emergencies and accidents.

The **ILO Working Environment (Air Pollution, Noise, and Vibration) Convention (No. 148)** says if it is not possible to reduce all of the air pollution employers must:

- Provide and maintain personal protective equipment and ensure it fits workers.

The **ILO Chemicals Convention (No. 170)** says that the boss is responsible for protecting workers from chemicals by first using safer chemicals and then by making changes to the workplace.

If personal protective equipment is needed, bosses are responsible for giving workers personal protective equipment and clothing at no cost to the worker, creating the right conditions to allow workers to use PPE correctly, and maintaining and replacing PPE when needed.

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