

Personal Protective Equipment



The pesticide label provides handling precautions, minimal **personal protective equipment (PPE)**, and other safety measures to minimize your exposure while handling pesticides. PPE comprises the clothing and devices you wear to protect your body from contact with pesticides. Wearing PPE can reduce exposure and lower the chances of pesticide injury, illness, or poisoning. **Basic protective work clothing consists of: a long-sleeved shirt, long pants, closed toed shoes, and socks.**

The EPA defines PPE as: coveralls, apron, gloves, footwear, headgear, eyewear, and respirators.

All pesticide applicators and handlers must understand the protections and limitations of PPE. Proper PPE selection, use, and care are essential. **Although PPE may reduce your exposure to pesticides, it does not necessarily eliminate it.**

Good Work Practices

It is important to take basic steps to reduce exposure when you handle pesticides or work in pesticide-treated areas. Remember to use common sense—no guidelines cover all situations.



- **Avoid Mouth Exposure**

Never eat, drink, chew gum, use tobacco products, or handle cellphones while working with pesticides. Contaminated hands are a source of oral exposure to pesticides.

- **Avoid Skin Exposure**

Wash your hands before using the toilet—the groin area readily absorbs pesticide.

Wear a minimum of a long sleeved shirt, long pants, and closed-toed shoes. Do not wipe contaminated gloves on your clothing—the pesticide may seep through.

- **Avoid Eye Exposure**

Wear protective eyewear to protect from splashes, sprays, mists, fogs and aerosols.

- **Avoid Inhalation Exposure**

Avoid breathing in dusts, spray droplets, or vapors. Wear a respirator when needed, even if the label does not require it.

- **Decontaminate Yourself and Your PPE**

First, wash your gloves with soap and water. Then take them off and wash your hands and face. Immediately wash off any pesticide that gets directly on you. Remove and replace damaged or contaminated clothing or PPE. Have spare clothing available. Wash or replace contaminated PPE at the end of the day.



- **Shower Immediately After Work.** Wash your hair and scalp and under your fingernails. Put on a complete change of clothing.
- After work, **Launder Your Work Clothes Separately** from non-work and other clothes.

Protect Yourself from Pesticides

A pesticide label lists the **minimum** PPE that an applicator, handler, and early-entry worker must wear. **Wearing anything less is illegal and dangerous.** All pesticide handlers (e.g., applicators, mixers and loaders, and flaggers) are responsible for following the pesticide label, including wearing PPE.

Examples of PPE Requirements on the Product Label

PERSONAL PROTECTIVE EQUIPMENT

Some materials that are chemical resistant to this product are barrier laminate or butyl rubber or nitrile rubber or neoprene rubber or polyvinyl chloride (PVC) or viton.

Applicators using spray equipment mounted on their backs must wear: Coveralls over long-sleeved shirt and long pants. Chemical-resistant footwear plus socks, and Chemical-resistant gloves such as barrier laminate or butyl rubber or nitrile rubber or neoprene rubber, or polyvinyl chloride (PVC) or viton.

Mixers, loaders, all other applicators, and other handlers must wear long-sleeved shirt and long pants, chemical-resistant gloves, such as barrier laminate or butyl rubber or nitrile rubber or neoprene rubber, or polyvinyl chloride (PVC) or viton, shoes plus socks, and chemical-resistant apron, when mixing/loading, cleaning up spills, cleaning equipment, or otherwise exposed to the concentrate.

Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables exist, use detergent and hot water. Keep and wash PPE separately from other laundry. Discard clothing and other absorbent materials that have been drenched or heavily contaminated with this product's concentrate. Do not reuse them.

PPE requirements are typically listed under the "[Precautionary Statements](#)" section of the pesticide label. If you work in or on a farm, forest, nursery, or greenhouse, also look for additional PPE requirements listed in the "[Agricultural Use Requirements](#)" box on the label. Always check to see if state regulations are more restrictive than label requirements. Some states have more restrictive safety regulations for pesticide applicators. When a state or local regulation is more restrictive than federal pesticide laws, it must be followed.



Under EPA's Worker Protection Standard (WPS; 40 CFR Part 170), agricultural employers are legally required to provide PPE that is in good working order. They also must train pesticide handlers on the proper use and maintenance of label-required PPE. PPE label requirements vary, depending upon the toxicity, formulation, dilution, and route of exposure of the pesticide product and activity. For example, a single label may have one set of PPE requirements for applicators and a different set for agricultural early entry workers going into areas during the restricted-entry interval. Even very low hazard pesticides require that a long-sleeved shirt, long pants, shoes, and socks be worn.

Consider all work situations where using PPE may be hazardous. Be careful around moving equipment with parts that can catch apron strings. Protective clothing can restrict evaporation of sweat, interfering with the body's natural cooling system. This can cause heat-related illnesses, including heat stress (see Chapter 4, [Pesticide Hazards and First Aid](#), for more information).

Protect Your Body

Different types of clothing, aprons, hats, boots, and gloves are not equally protective against all pesticides and under all conditions. For PPE to be protective, it must:

- Shield your head, face, neck, trunk, arms, legs, and feet from exposure while handling pesticides.
- Be durable and resist punctures and tears during normal use.
- Be comfortable enough without restricting your movement so you will wear it.

To protect your skin, your normal work clothing must cover most of your body. Depending on the product's toxicity and use, coveralls, apron, hat, boots, and gloves may also be required. Protective clothing, gloves, and boots must provide a barrier while you are exposed to a pesticide. Labels may require waterproof gloves or boots. Additionally, chemical-resistant gloves, aprons, hats, boots, or suits are required on some labels. EPA defines "**chemical resistant**" as preventing any measurable amount of material from moving through (breaking through) the fabric or material. Things that can affect the extent of breakthrough are contact time, concentration, temperature, and the product itself. When selected correctly, protective clothing reduces the risk of dermal exposure but does not eliminate it.

Your **work clothes** provide a basic barrier to minimize pesticide contact with your skin. Select work clothes made of tightly woven fabrics to reduce pesticide penetration. Make sure they are free of holes and tears. Fasten the shirt collar completely to protect the lower part of your neck. Do not use these work clothes for anything other than handling pesticides. Store and launder fabric work clothing separately from all other clothing after each day's use. See "[Maintaining Clothing and Personal Protective Equipment](#)" at the end of this chapter for details on cleaning and disposing of pesticide-soiled work clothes.

Basic work clothes

- Always wear at least a long-sleeved shirt and long pants.
- Make sure work clothes are durable.
- Wash work clothes at the end of the day, separate from other clothing.

Coveralls

Some pesticide labels require **coveralls** (a second layer of clothing) over work clothes. They must be **loose-fitting, one or two-piece garments that cover the entire body except head, hands, and feet**. A coverall can be made of woven (like cotton or twill) or nonwoven fabrics. It must be durable so it does not rip, tear, or puncture easily. It should be either easy to clean and sturdy enough for laundering and repeated use or disposable.

Wearing a disposable coverall reduces decontamination time and lowers the risk of contaminating yourself, your application equipment, and your vehicle. Most importantly, wearing coveralls lessens the chance that you will take pesticides home. Handle disposable coveralls carefully, do not contaminate other people. Very few pesticides require a chemical-resistant coverall. If one is required, work with your PPE supplier to find one that provides the necessary level of protection based on the tasks you perform, the product formulation, and exposure.

Apron for mixing

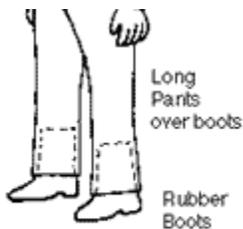


Some pesticide labels require you to wear a chemical-resistant apron when mixing or loading a pesticide, or when cleaning application equipment. Select an apron that **covers the front of your body from the middle of the chest to the knees**.

Headgear for Overhead Applications

A pesticide label may require chemical-resistant headgear if an overhead application may result in exposure. The headgear **must protect against sprays so that no liquid breaks through the hat or hood**. You may use either a chemical-resistant hat with a wide brim or a hood. Hoods attached to jackets or spray suits protect your neck and back from pesticide sprays that might otherwise run down your back. Wash headgear at the end of the day. When making overhead applications, **do not use headgear made of absorbent material, such as cotton, leather, or straw**. Cotton ball caps absorb pesticides. Do not wear them if overhead exposure is a concern.

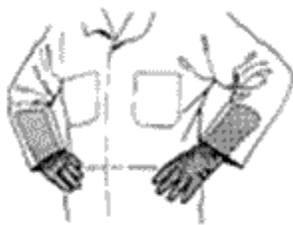
Footwear



Pesticide labels require you to wear **socks and closed-toed shoes**. Some product labels require you to wear chemical resistant footwear. A heavy-duty pair of unlined rubber boots or shoe covers provides protection from pesticides. Wear heavy-duty rubber boots that extend past your ankle and at least halfway up to your knee if you will enter or walk through treated areas before spray has dried. **Put your pant legs outside your boots to prevent pesticides from running down your legs and becoming trapped in your footwear**. Wash the boots inside and out at the end of the day.

Leather and canvas absorb pesticides and cannot be decontaminated. Regulations allow you to substitute leather for chemical-resistant boots only when the chemical-resistant footwear required by the pesticide label is not durable enough for use in rough terrain. **Do not use these boots for other purposes.**

Gloves



Pesticide handlers get by far the most exposure from pesticides on their hands and forearms. Research has shown that workers mixing pesticides received 85% of the total exposure on their hands and 13% on their forearms. The same study showed that wearing protective gloves reduced exposure by 99%. Protective gloves are essential to protect your skin. Pesticide labels often require waterproof gloves or one of the following **glove types**: nitrile rubber, butyl rubber, neoprene rubber, barrier laminate, and Viton®.



Each glove type varies significantly in how well it protects from the different solvents in formulated products. **Read each label to determine which glove type is appropriate**. This can vary from product to product, even those with similar active ingredients. The solvent in a formulation determines the type of protective glove to wear. Pesticide labels require either waterproof gloves (for solid or water-based formulations) or chemical resistant gloves for the various solvents (e.g., alcohols, ketones, and petroleum distillates) used in different formulations.

For liquid products that use a solvent other than water, EPA requires the label to specify particular glove materials that provide protection. Read the label carefully to make sure you have the correct protective glove material. Some pesticide labels specify both the glove material and its thickness. As a general rule, the thicker the glove (of the same material under identical conditions), the longer the breakthrough time. A pesticide label's specification of glove type is generally based upon a thickness of 14 mils, except for polyethylene and barrier laminate gloves. Use the 14 mils thickness as a rule of thumb when selecting glove materials that appear on the pesticide label.



Glove durability is another important consideration. Select a glove that is protective, does not tear or puncture easily, and protects you for the duration of the task. Discard them if there is any sign of wear or if they leak. Do not use gloves made of any kind of absorbent material, lining, or flocking, including leather or cloth (exception: cloth gloves are used with fumigants). These types of gloves absorb pesticide and trap it closely against your bare skin, greatly increasing skin absorption.

Choose a glove size that fits you comfortably. Gloves that fit well provide increased dexterity for equipment maintenance or calibration. Gloves that are too tight stretch the material, allowing pesticides to break through. Gloves that are too large can get caught in equipment. Gloves that are too loose may allow pesticides to run down the inside and be directly absorbed by your skin. Select gloves designed to give you extra protection when needed for the job. Use elbow-length gloves when mixing and loading. Wear gloves according to how you are applying the pesticide. Do not use a glove beyond the breakthrough time.

When using reusable gloves, rinse them at each break and wash them thoroughly at the end of the workday. Absorbed pesticides will continue to enter the material if not removed. Make sure your gloves are in top condition. Throw out any gloves showing wear. Check glove integrity before each use. Rinse disposable gloves before discarding them.

Good work practices – gloves

- Wear waterproof or chemical resistant gloves when applying pesticides. Although pesticide labels do not always specifically require gloves, wearing them reduces your exposure (except when handling fumigants).
- Check gloves closely for holes by filling them with clean water and gently squeezing. Discard them if you find any leakage.
- Wear gloves whenever you might get pesticides or residue on your hands, such as when cleaning sprayer nozzles or working around contaminated equipment or surfaces.
- If pesticide is spilled, splashed, or gets inside your gloves, take them off immediately. Wash your hands and put on a clean pair of gloves.
- Replace your gloves immediately if they get cut, torn, or damaged.
- If making several applications during the day, change gloves between jobs to avoid contaminating yourself and your vehicle.

Protect Your Eyes



Eyes readily absorb pesticides. When a label says to wear protective eyewear, you may use goggles; a face shield; safety glasses with shields at the front, brow,

and temple; or a full-face respirator. Use common sense and select eyewear that protects you for the task. Eyewear made of impact-resistant material, such as polycarbonate, can protect you from flying objects, such as granular pesticides. However, safety glasses will not protect your eyes from pesticide splashes.



Products that are corrosive to the eyes (e.g., Danger signal word) require a particular type of eyewear. For example, goggles may be required when your eyes may be exposed to liquids or particulates during a certain application or use. Wear tightly fitting goggles when you are in high-exposure situations, such as an open cab during an air-blast application; applying mists, fogs, or aerosols indoors; or in any other location where you will be enveloped in a spray, mist, or dust. Make sure goggles are splash- and spray-proof and have an air baffle system for airflow and no side vents. If fogging is a problem, use anti-fog lens treatments or purchase low-fog goggles. If your eyewear has a headband that is made of pesticide-absorbent material, change it often or use a rubber strap. If possible, wear the strap under your hat or hood to protect it from becoming contaminated.

Protective eyewear can be worn with a half-face respirator. If you wear eyeglasses, you can buy an eyeglass insert for your full-face respirator that is fitted with your prescription. People who wear contact lenses should consult an eye doctor or their medical professional before using pesticides or wearing respirators.

- Minimum eyewear is safety glasses with shields at the front, brow, and temple.
- If goggles are required, have an eyewash dispenser immediately available.
- Consult an eye doctor if you wear contact lenses.

Protect Your Respiratory System



When you use pesticides, you may be exposed to toxic gases, vapors, particulates (solids or liquids), or all of these. A **respirator** is a safety device that protects you from inhaling contaminated air. The pesticide label states whether you must use a respirator and if so, which type. The respirator type is based on the pesticide formulation, application method, and environment where the application is made.

The National Institute for Occupational Safety and Health (NIOSH) certifies that respirators have been tested according to certain standards. The NIOSH approval of a respirator indicates that it protects the wearer against specified contaminants. All respirator manufacturers issue approval certificates with a chart of all of the components considered part of the approved assembly. Respirator approvals are manufacturer-specific: do not interchange parts, cartridges, or filters between different manufacturers' units. These certificates are typically package inserts with new respirators, cartridges, and filters. Find out if there are federal or state health and safety regulations that stipulate proper respirator selection, care, and use.



There are other respirators on the market that are not NIOSH-approved, such as nuisance dust masks and some surgical masks. **When a respirator is required, wear a NIOSH-approved device that is listed on the pesticide label.**

Types of Respirators

The two classes of respirators most often required for protection from pesticide exposure are **atmosphere-supplying** and **air-purifying respirators**.



Atmosphere-supplying respirators provide clean, breathable air from an uncontaminated source. Examples are airline respirators and self-contained breathing apparatus. In very specific uses, such as releasing phosphide fumigants in enclosed areas, the environment may be immediately dangerous to life and health. In these cases, the only kind of atmosphere-supplying respirators that may be used are either a pressure demand self-contained breathing apparatus (SCBA) with a full face piece or a pressure-demand full face piece air-line respirator with an SCBA escape bottle for emergencies.

Air-purifying respirators (APRs) remove contaminants from the air that you breathe. They do not supply oxygen and should never be used in an environment that has limited oxygen or is immediately dangerous to life or health. Air-purifying respirators may be either powered or non-powered.

- **Powered air-purifying respirators (PAPRs)** use a blower to pass contaminated air through purifying elements. PAPRs are available with a tight-fitting face piece or a loose-fitting hood.
- **Non-powered air-purifying respirators** have tight-fitting face pieces that seal directly to your face. There are single-use particulate filtering face piece respirators and half-masks and full face piece masks with replaceable purifying elements. Gas masks, which use canisters instead of cartridges, are one type of APR.



Purifying Elements for Air-Purifying Respirators

When selected and used appropriately, elements for air-purifying respirators remove specific contaminants from the air passing through them. The pesticide label specifies which type of purifying element is required. Elements that remove particulates (e.g., dusts or sprays) are called filters, while vapor- and gas-removing elements are called either chemical cartridges or chemical canisters.

Particulate Filters



Particulate filters remove dusts, aerosols, or sprays suspended in the air that you breathe. Particulate filters **DO NOT** remove gases or vapors. The type of filter required on the pesticide label depends on whether the respirator is powered or non-powered.

EPA regulations require that you replace particulate filters according to respirator manufacturer recommendations or pesticide labeling (whichever is more frequent). If there are no other use directions, dispose of particulate filters at the end of eight hours of cumulative use.

Chemical Cartridges or Canisters

Chemical cartridges or canisters use sorbents to remove contaminant specific gases and vapors. They do not remove particles. The most typical chemical cartridge or canister specified by the label for pesticide applications is an organic vapor removing (OV) cartridge or canister.

- Always use the type of chemical cartridge or canister purifying element required by the pesticide label.
- Keep purifying elements sealed until ready to use.
- Although it is not a requirement, some respirator manufacturers stamp the expiration date of purifying elements on the outside of the product package. Do not use a purifying element after the expiration date, even if it was never opened.

The service life of a chemical cartridge or canister depends on the type and concentration of pesticide, the user's breathing rate, and humidity.

Chemical cartridge respirators, when selected appropriately, are essentially 100% efficient until the gas or vapor breaks through. Any taste, smell, or irritation indicates that breakthrough of the pesticide has occurred. **Cartridges should be changed immediately whenever you detect breakthrough in the mask.** Once used, an organic vapor cartridge must be disposed of at the end of the day. The pesticide trapped by the sorbent in the cartridge may desorb very easily overnight. If you were to use the cartridge the next day, you could breathe in the desorbed pesticide vapors. **Always dispose of chemical cartridges at the end of a workday unless the manufacturer directs otherwise.**

Combination Chemical Cartridge and Particulate Filters

The pesticide label may direct you to use both a chemical cartridge or canister and a particulate filter. You have two options:

- A chemical cartridge or canister with a disposable N, R, or P filter using a retaining ring.
- A single combination cartridge or canister.



The combination chemical cartridge or canister for nonpowered air-purifying respirators will include N-, R-, or P-rated filters. The combination chemical cartridges for powered air-purifying respirators will include an HE filter.

Follow the same change-out practices listed individually for particulate filters and chemical cartridges. For example, if you were using a combo chemical cartridge with a P100 filter and detected breakthrough in your mask, you would change out your cartridges immediately even though the filter was still useable.

Identifying the Respirator Type from the Pesticide Label

The respiratory protection required by the pesticide label is product and task-specific. The pesticide label will typically cite respiratory protection required using a NIOSH "TC" (Testing and Certification) designation. The NIOSH designations correspond to the types of respirators that may be specified by the pesticide label and include: TC-84A, TC-21C, TC-23C, TC-14G, TC-13F, and TC-19C.

Use Tight-Fitting Respirators Properly

Before selecting and using any respirator, get a medical evaluation to make sure wearing a respirator does not endanger your health. Next, read and understand the manufacturer's instructions and NIOSH approval certificate that accompany the respirator and its components. For full protection, conduct a fit test before wearing a tight-fitting particulate-filtering face piece, half mask, or full-face mask. When wearing a tight-fitting respirator, nothing must interfere with the seal between the surface of the mask and your face, including beards and stubble.



Fit Tests

Fit testing is a method to select the right size and type of tightfitting respirator for your face. Perform a qualitative or quantitative fit test of a given mask type on a user's face to select the best-fitting respirator. It is important to get a fit test annually and whenever you use a different respirator face piece. Get fit tested again whenever something physically changes that could affect the fit of your respirator (e.g., facial scarring, dental work, cosmetic surgery, or a significant change in body weight). **A respirator cannot protect you from pesticide exposure if it does not fit your face.**

Always consult the pesticide label for the appropriate respirator and purifying elements. If you have any questions about your respirator, consult the manufacturer or use online resources. Be sure to review the manufacturer approved labels for use limitations of the respirator.

Maintaining Clothing And Personal Protective Equipment

At the end of each workday, wash all work clothes and PPE. Some items, such as clothes and coveralls, can be washed using a washer and dryer. Other items, such as gloves, protective suits, goggles, aprons, boots, and eyewear, require hand washing. Wear protective gloves when handling contaminated items. Rinse and discard disposable items. Dispose of any non-reusable or contaminated item carefully to prevent cross-contamination or contamination of others who might handle the discarded item. Dispose of heavily contaminated items as household hazardous waste.

Laundering Pesticide Contaminated Clothing

- ❖ Use **heavy-duty liquid detergent** for ECs
- ❖ Use **2 cycles** for moderate to heavy contamination
- ❖ **Rinse the washer** with an "empty load"



Woven Work Clothes and Coveralls

Laundry fabric coveralls and work clothing after each day's use. Some common sense guidelines for cleaning pesticide-soiled clothing include:

1. **Outdoors, shake any dry material from cuffs and pockets and then hang garments out to air.**
2. **Wash work clothes and coveralls worn when handling pesticides separately from other laundry.**
3. **Load only a few items into the washing machine so there is plenty of agitation and water for dilution.**
4. **Use hot water and the highest water level.**
5. **Prerinse items by using the prewash cycle.**
6. **Use heavy-duty liquid detergent.**
7. **Run the washer on the longest wash cycle. Use two entire machine cycles for lightly or moderately contaminated items.**
8. **Properly handle and discard heavily contaminated clothing.**
9. **Line dry laundered items outdoors if possible.**
10. **Run one additional empty cycle without clothing, using detergent and hot water, before using the washer for your household laundry. If using a laundry service, notify them the clothing may be contaminated with pesticides.**

Never wash any garments made of absorbent materials that have been splashed or soaked with undiluted pesticide or large quantities of diluted pesticide. Remember to remove them immediately and dispose of them carefully.

Nonwoven Clothing

Coveralls may be either a one-day disposable item or a reusable garment. Be sure to check the PPE manufacturer's use limitations and laundering instructions. Replace these garments regularly and at any sign of wear. If any PPE cannot be cleaned properly, dispose of it according to applicable federal, state, and local regulations. Follow manufacturers' instructions, if any, for the service life of reusable nonwoven garments. Pay close attention when reusing these items, and be ready to change them whenever you think that the inside surface may be contaminated. If using disposable garments, render them unusable and discard. If they are heavily contaminated with high-risk pesticides, handle them appropriately and take them to a household hazardous waste facility.

Boots and Gloves

Be sure to clean boots and gloves, even if they are worn only briefly. Before taking your gloves off, wash them thoroughly. Wash both the inside and outside of boots and gloves once removed. Inspect these items and discard if there is any sign of wear or if they leak. Hang or leave to dry. Gloves are not designed to be reused over and over. Replace them often to ensure protection of your hands. Properly cared for, boots should last multiple seasons. Sun will degrade rubber materials quickly, so store gloves and boots out of the sun.

Eyewear and Respirators

Most eyewear, respirator bodies, face pieces, and helmets are designed to be cleaned and reused. These items can last many years if they are good quality and are maintained according to the manufacturer's directions. Respirators require more maintenance than most PPE. When you have finished using your respirator, remove and properly dispose of any expendable components, such as filters, cartridges, or canisters. Wash the face piece according to the respirator manufacturer's directions. Take care to clean under and around gaskets and valves. Allow to air dry. Store cleaned respirators, as well as replacement purifying elements, in a clean, dry

place that is not exposed to sunlight or extreme temperatures. Make sure that the rubber face piece is not distorted when stored so that it maintains its shape. Do not store any protective equipment—including respirators—with or near pesticides or other chemicals.

Summary

Wearing PPE can reduce the potential for dermal, inhalation, ocular, and oral exposure, this lowers the chances of pesticide injury, illness, or poisoning. Check the pesticide label for the minimum PPE required by law. In order to appropriately select and wear PPE, you must understand both its protections and its limitations. Then determine what protective equipment you need for the pesticide task at hand.

Check the “[Agricultural Use Requirements](#)” box on the label and the WPS requirements for any other statements about PPE use in farms, forests, nurseries, or greenhouses.