

PERSONAL
PROTECTIVE
EQUIPMENT GUIDE
**CHOOSING
CHEMICAL-
RESISTANT
PPE**



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Many pesticide labels instruct the user to wear personal protective equipment (PPE) — clothing and devices that protect the body from contact with pesticides or pesticide residues. Some labels require the use of **chemical-resistant** PPE — items that the pesticide cannot pass through during the time it takes to complete the task. The labels of a few pesticides, such as some fumigants, prohibit the use of chemical-resistant PPE.

Most chemical-resistant PPE items are plastic or rubber. But not all these materials are equally resistant to all pesticides and under all conditions.

Chemical Resistance

Three factors affect a material's chemical resistance: the exposure time, the exposure situation, and the chemical properties of the pesticide product to which the material is exposed.

Exposure time

Not all types of materials that are resistant to a particular pesticide will provide protection for the same amount of time. Some will keep the pesticide out for a long time. Others will allow the pesticide to reach the skin fairly quickly. Disposable plastic gloves, shoe covers, or aprons may provide enough protection for tasks that can be done in a few minutes. Longer jobs usually require items made of a more resistant material.

A pesticide begins to move into a material as soon as it gets on the surface. The pesticide continues to move into and through the material until the pesticide is removed. Help prevent pesticides from getting through chemical-resistant items, such as gloves, boots, and aprons, by regularly rinsing off pesticides that are splashed or spilled on them.

Chemical resistance is often stated in terms of exposure time (the time from first exposure until the chemical breaks through to the other side of the



material). For example, neoprene may be resistant to one solvent for 30 minutes or less and to another solvent for more than 4 hours.

Exposure situation

A chemical-resistant material will not continue to be protective if it is damaged. For tasks that involve handling sharp objects or walking through rough terrain, a sturdy material would be necessary to resist punctures or tears.

Type of chemical

No single material can protect against all pesticide products. The chemical resistance of a material depends on whether the pesticide is liquid or dry, and what diluents or solvents are used.

Chemical Resistance of PPE Materials

Unless the pesticide label directs otherwise, do not use items that are made of — or lined with — absorbent materials such as cotton, leather, and canvas. These materials are not chemical resistant, and they are difficult or impossible to clean after a pesticide gets on them. Even dry formulations can move quickly through woven materials and may remain in the fibers after several launderings.



Look for PPE items whose labels state that the materials have been tested using ASTM (American Society for Testing Materials) test methods for chemical resistance, such as test method F739-91. Gloves and footwear made of polyvinyl chloride (PVC) or rubber (butyl, nitrile, neoprene, or natural rubber) must be at least 14 mils thick.

Pesticides can leak through stitching holes and gaps in seams. For chemical resistance, PPE should have sealed seams.

Do you need advice on choosing PPE? Try PPE catalogs, manufacturers, or dealers; the pesticide manufacturer or dealer; or the Cooperative Extension Service.

Barrier-laminate materials are resistant to most pesticides and are a good choice for many situations.

Barrier-laminate (Silver Shield®/4-H®) gloves may be uncomfortable and clumsy to wear for some kinds of tasks. Try wearing fitted rubber gloves over barrier-laminate gloves for comfort, protection, and dexterity.



Any plastic or rubber material is resistant to dry pesticides and to water-based pesticides (those that use water as the only diluent or solvent).

Dry pesticides include dusts, granules, pellets, and some baits. Water-based pesticides include wettable powders, soluble powders, some solutions, dry flowables (water-dispersible granules), and microencapsulated pesticides.

The type of material that is resistant to non-water-based liquid pesticides depends on the contents of the formulation.

Liquid pesticides that are not water-based may be emulsifiable concentrates, ultra-low-volume and low-volume concentrates, low-concentrate solutions, flowables, aerosols, dormant oils, and invert emulsions. Common solvents are xylene, fuel oil, petroleum distillates, and alcohol.

Choosing Chemical-Resistant PPE

Materials not listed on label

If the pesticide label requires the use of chemical-resistant PPE but does not indicate the types of materials that are resistant to the product, select sturdy barrier-laminate, butyl, or nitrile materials. Then watch for signs that the material is not chemical-resistant. For example, the material may:

- change color,
- become soft or spongy,
- swell or bubble,
- dissolve or become jelly-like,
- crack or get holes,
- become stiff or brittle.

If any of these changes occur, discard the item and choose another type of material.

Specific PPE materials listed directly on label

If the pesticide label specifies the PPE materials that **must** be worn when using the product, follow those instructions.

Some labels may list **examples** of PPE materials that are highly chemical resistant to the product. The label may say, for example: "Wear chemical-resistant gloves, such as barrier laminate, butyl, nitrile, or viton." You may choose PPE items made from any of the listed materials.

Chemical-resistance category listed on label

Pesticide labels that list examples of PPE materials will often also specify a chemical-resistance category (A through H) for the product. This allows you to consult an EPA chemical-resistance chart (such as the one in this brochure) to learn whether you have PPE material options other than those listed in the examples on the label.

Using the Chemical-Resistance Category Selection Chart

When pesticide labels list a chemical-resistance category, you can find that category on an EPA chemical-resistance category selection chart, such as the one in this brochure, to determine the entire range of PPE materials from which you can choose. The chart indicates how long you can expect the various types of PPE materials to be resistant to the type of pesticide you are using.

Failure to replace or clean the PPE items within the time intervals specified on the chart would be considered a misuse of the pesticide, because the items would no longer meet the label's requirements for "chemical-resistant" PPE.

When choosing an appropriate material, also consider the dexterity needed for the task and whether the material will withstand the physical demands of the task. The PPE will protect you for the approximate time listed on the chart, if:

- no punctures, tears, or abrasions allow pesticide to penetrate the material, and
- pesticide does not get inside the PPE through careless practices, such as allowing pesticide to run into gloves or footwear or putting the PPE on over already contaminated hands or feet.

Highly resistant PPE

A rating of **high** means that the material is highly resistant to pesticides in that category. PPE made of this type of material can be expected to protect you for an 8-hour work period. The outside of the PPE, especially gloves, should be washed at rest breaks — about once

EPA CHEMICAL RESISTANCE CATEGORY SELECTION CHART

For use when PPE section on pesticide label lists a chemical resistance category

SELECTION CATEGORY LISTED ON PESTICIDE LABEL	TYPE OF PERSONAL PROTECTIVE MATERIAL							
	Barrier Laminate	Butyl Rubber ≥ 14 mils	Nitrile Rubber ≥ 14 mils	Neoprene Rubber ≥ 14 mils	Natural Rubber* ≥ 14 mils	Polyethylene	Polyvinyl Chloride (PVC) ≥ 14 mils	Viton ≥ 14 mils
A <i>(dry and water-based formulations)</i>	high	high	high	high	high	high	high	high
B	high	high	slight	slight	none	slight	slight	slight
C	high	high	high	high	moderate	moderate	high	high
D	high	high	moderate	moderate	none	none	none	slight
E	high	slight	high	high	slight	none	moderate	high
F	high	high	high	moderate	slight	none	slight	high
G	high	slight	slight	slight	none	none	none	high
H	high	slight	slight	slight	none	none	none	high

**includes natural rubber blends and laminates*

- HIGH:** Highly chemical-resistant. Clean or replace PPE at end of each day's work period. Rinse off pesticides at rest breaks.
- MODERATE:** Moderately chemical-resistant. Clean or replace PPE within an hour or two of contact.
- SLIGHT:** Slightly chemical-resistant. Clean or replace PPE within ten minutes of contact.
- NONE:** No chemical-resistance. Do not wear this type of material as PPE when contact is possible

every 4 hours. Highly resistant PPE is a good choice when handling pesticides, especially concentrates, for long periods of time.

Moderately resistant PPE

A rating of **moderate** means that the material is moderately resistant to pesticides in that category. PPE made of this type of material can be expected to protect you for 1 or 2 hours. After that, replace the PPE with clean chemical-resistant PPE or thoroughly wash the outside of the PPE with soap and water. Moderately resistant PPE may be a good choice for pesticide handling tasks that last only a couple of hours.

Slightly resistant PPE

A rating of **slight** means that the material is only slightly resistant to pesticides in that category. PPE made of this type of material can be expected to protect you for only a few minutes after exposure to the pesticide product. After that, replace the PPE or thoroughly wash the outside of the PPE with soap and

water. Slightly resistant PPE may be a good choice for pesticide handling tasks that last only a few minutes.

Inexpensive disposable gloves or shoe covers, such as those made from polyethylene, may be useful for such brief tasks as:

- adjusting contaminated parts of equipment,
- unclogging or adjusting nozzles,
- opening pesticide containers,
- moving open pesticide containers or containers with pesticides on the outside,
- handling heavily contaminated PPE,
- climbing in and out of cabs or cockpits where the outside of the equipment is contaminated, and
- operating closed systems.

These disposable PPE items should be used only once, for a very short-term task, and then discarded. At the end of the task, it is a good idea to first wash the outside of the gloves or shoe covers, and then remove them by turning them inside out. Discard them so they cannot be reused.

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PPE Guides in this series include:

- Coveralls, Gloves, and Other Skin Protection
- Clothing Layers for Added Protection
- Choosing Chemical-Resistant PPE
- Protective Eyewear
- Respirators
- Inspecting, Maintaining, and Replacing PPE
- Avoiding Heat Stress

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