

5. Containment and PPE

Overview of Containment

The goal of containment is to limit the spread of mold throughout the building in order to minimize the exposure of remediators and building occupants to mold.

The larger the contaminated area, and the greater the possibility that someone will be exposed to mold, the greater the need for containment. Although, in general, the size of the contaminated area indicates the level of containment required, the final choice of containment level should be based on professional judgment. Heavy mold growth in a small area, for example, could release more mold spores than lighter growth in a relatively large area. In this case, the smaller contaminated area may warrant a higher level of containment.

Two types of containment are described in EPA's mold remediation guidance:

- Limited
- Full

Limited containment is generally used for areas involving less than 10 square feet of mold contamination. Full containment should be considered for areas larger than 10 square feet or where the mold contamination is heavy. In cases where it is likely that mold could be spread throughout the building during remediation.

Maintaining the containment area under negative pressure will keep contaminated air from flowing into adjacent, uncontaminated areas and possibly spreading mold. A fan exhausted to the outside of the building can be used to maintain negative air pressure. If the containment is working, the polyethylene sheeting of the containment area should billow inward on all surfaces. If it flutters or billows outward, containment has been lost, and the problem should be found and corrected before remediation continues.

Depending on the situation, professional remediators may choose to use a variety of containment methods not described in detail here. For example, a remediator repairing a large building with extensive mold damage in the walls may choose to remove the outside layer of the wall and work inward, relying on appropriate containment to ensure mold is not spread throughout the building. Or, to limit the amount of mold that gets into the air, a remediator may apply sticky-backed paper or covering to a moldy wall component before removing it.

Limited Containment

Limited containment consists of a single layer of 6-mil fire-retardant polyethylene sheeting enclosing the moldy area. Access to the contained area is through a slit entry covered by a flap on the outside of the containment area. Limited containment is generally recommended for areas involving small scale mold contamination.



In small areas, the polyethylene sheeting can be secured to the floor and ceiling with duct tape. In larger areas, a frame of steel or wooden studs can be built to hold the polyethylene sheeting. Epoxy can also be used to fasten the sheeting to the floor or ceiling.

All supply and air vents, doors and pipe chases in the containment area must be sealed with polyethylene sheeting to minimize the spread of mold and mold spores to other areas of the building. Stairs should also be sealed if a riser is missing or open. (A pipe chase is an enclosure through which pipes are run; a riser is the upright piece of a stair step, from tread to tread).

Mold growth on ceiling tiles may affect HVAC systems if the space above the ceiling is used as a return air plenum. If you are unsure how your HVAC system operates, contact your HVAC company to determine how the HVAC system operates. In such cases, containment would be installed from floor to ceiling deck. The filters in the air-handling units serving the affected area may have to be replaced once the remediation is complete.

Full Containment

Full containment should be done by a mold remediation contractor. It is good to understand the expectation of what full containment is but, should not be attempted without the proper training.

Full containment is recommended for the clean-up of mold-contaminated surface areas that are large in scale and when intense or long-term exposures are expected. It is also recommended if it appears likely that the occupant's space would be further contaminated if full containment were not used because high levels of airborne dust or mold spores are likely. Full containment requires double layers of polyethylene sheeting to create a barrier between the moldy area and other parts of the building. A decontamination chamber or airlock -- an area with doors between the contaminated area and the clean area -- should be built for entry into and exit out of the remediation area.

The entryways from the outside into the airlock and from the airlock into the containment area should be slits covered by flaps on the outside surface. The chamber should be large enough to hold a waste container and allow a worker to put on and remove Personal Protective Equipment (PPE). All contaminated PPE, except respirators, should be placed in a sealed bag while in this chamber.

Respirators should be worn until remediation workers are outside the decontamination chamber.

Personal Protective Equipment

The primary function of personal protective equipment is to limit mold exposure.

If a remediation job disturbs mold, and mold spores then become airborne, the risk of respiratory exposure increases. Actions likely to stir up mold include:

- Breaking moldy porous materials such as wallboard

- Using invasive procedures to examine or remediate mold growth in wall cavities
- Stripping or peeling wallpaper to remove it
- Using fans to dry items

Levels of Personal Protective Equipment (PPE)

- Minimum: Gloves, N-95 respirator, goggles/eye protection
- Limited: Gloves, N-95 respirator or half-face respirator with HEPA filter, disposable overalls, goggles/eye protection
- Full: Gloves, disposable full body clothing, head gear, foot coverings, full-face respirator with HEPA filter

Gloves

Gloves protect the skin from contact with mold. They also protect the skin from potentially irritating cleaning solutions. Long gloves that extend to the middle of the forearm are recommended.

The material from which gloves are made should be suited to the type of materials being handled. If you choose to use a biocide, such as chlorine bleach, or a strong cleaning solution, gloves should be made from:

- Natural rubber
- Neoprene
- Nitrile
- Polyurethane
- Polyvinylchloride (PVC)

If a mild detergent is being used, ordinary household rubber gloves are suitable. The routine use of biocides is not recommended. For more information on the use of biocides in mold remediation, see [Chapter 1.7](#).

Eye Protection

Properly fitted goggles or full-face respirators provide eye protection. Goggles must be designed to keep out dust and small particles. Safety glasses or goggles that have open vent holes are not acceptable.

Respirators

Respirators protect remediation workers from inhaling airborne mold, mold spores and dust. Three types of respiratory protection are described:

- Minimum



- Limited
- Full

Only respirators approved by the National Institute for Occupational Safety and Health (NIOSH) should be worn during mold remediation. These respirators must be used according to any applicable Occupational Safety and Health Administration (OSHA) regulations.

If you are going to use any respirator you will need to have a Respiratory Protection Program in place.

Some of the key elements that you will need in your respiratory protection program are:

1. OSHA Medical Evaluation Questionnaire (Appendix C of 29 CFR 1910.134: OSHA Respirator Medical Evaluation Questionnaire)
2. Medical provider review of the questionnaire for each employee
3. Medical Authorization for each employee that will be wearing a respirator from the medical provider
4. Fit testing of the respirators that will be used
5. Training
6. Written Program

Use minimum PPE when cleaning up a small area affected by mold (less than 10 square feet total). Minimum PPE includes gloves, goggles/eye protection and an N-95 respirator. An N-95 respirator covers the nose and mouth, filters out 95 percent of airborne particulates and is available in most hardware stores. Includes the use of half-face or full-face air purifying respirators (APRs) equipped with P100 filter cartridges. These respirators have inhalation and exhalation valves that filter the air and ensure it is free of mold particles. The P100 filters do not remove vapors or gases, and the half-face APRs do not protect the wearer's eyes. Professional judgment should be used to make the final determination about what PPE to wear.

Full PPE includes a full-face, powered air purifying respirator (PAPR). It is recommended when large scale contamination mold is found, when high levels of airborne dust or mold spores are likely, or when intense or long-term exposures are expected. A powered air purifying respirator uses a blower to force air through a P100 filter. The filtered air is supplied to a mask that covers the wearer's face or a hood that covers the entire head. Positive pressure within the hood prevents unfiltered air from entering through penetrations or gaps. Individuals must be trained to use their respirators before they begin remediation.

Disposable clothing is recommended for medium and large remediation projects. It prevents the transfer and spread of mold to clothing and eliminates skin contact with mold. When limited protection is warranted, disposable paper coveralls can be used. When full protection is required, a body suit of breathable material, such as TYVEK®, and mold-impervious disposable head and foot coverings should be used. All gaps, such as those around ankles and wrists, should be sealed. (Many remediators use duct tape to seal clothing).