

# Spray Polyurethane Foam: Guidance for the Removal and Disposal of SPF Insulation and Roofing



**Spray Foam Coalition**  
Center for the Polyurethanes Industry



Spray Foam  
Coalition

### Scope

This document provides guidance on the removal and disposal of spray polyurethane foam (SPF) for:

- SPF insulation and roofing contractors
- General construction and demolition contractors
- Restoration and remediation contractors
- Building owners

### Reasons for Removing SPF from a Building

SPF may need to be removed from a building for a variety of reasons. One common reason for SPF removal may be to perform additional construction or building modifications, which would require partial or full removal of the building envelope assembly containing SPF. In the case of SPF roofing systems, the SPF may need to be removed prior to re-application. In some cases, the SPF may need to be removed because it is defective, misapplied or damaged.

SPF targeted for removal can be divided into three general categories based on the condition of the SPF and the potential for a chemical or biological hazard. The determination of the category for the SPF being considered for removal can be made by the SPF manufacturer or an expert consultant onsite.

**Category I** SPF are completely reacted and cured. As stated by the EPA, after SPF is applied and cured, it is considered to be relatively inert.<sup>1</sup> Although Category I SPF may present a respirable dust hazard during removal, these SPF are considered to be chemically inert and present no chemical hazard for those removing and handling the material. Many SPF manufacturers provide Safety Data Sheets for reacted SPF products.

**Category II** SPF are those that have been determined not to have completely reacted and cured. Incompletely reacted SPF could be due to factors such as improperly mixed and off-ratio installation. SPF that has not been allowed to cure for the amount of time recommended by the manufacturer would generally be included in Category II SPF. Category II SPF may not be chemically inert and could present a chemical hazard for those removing and handling the material.

**Category III** SPF are Category I SPF (fully reacted SPF) that have been damaged by an external factor such as a fire, flood or growth of mold or mildew.

*NOTE 1: It is beyond the scope of this document to determine the condition and the category of the SPF. Determining the precise condition of a SPF is often product-dependent and may require examination or testing by a representative from the SPF manufacturer or expert consultants.*

*Note 2: SPF saturated by floodwaters may contain a variety of unknown chemical compounds. The chemical composition of the absorbed floodwaters may need to be determined and special handling of these SPF may be considered. SPF with mold and mildew growth should be evaluated and removed by a mold remediation specialist.*

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<sup>1</sup> [http://www.epa.gov/dfe/pubs/projects/spf/exposure\\_potential.html](http://www.epa.gov/dfe/pubs/projects/spf/exposure_potential.html)

Table 1 provides examples for types of SPF removal jobs that may fall into each category. Each removal is unique and an expert onsite makes the determination for the specific removal and remediation steps to follow.

**Table 1: SPF Categories for Removal**

SPF Condition	Description	Examples and causes
Category I	Fully cured SPF	<ul style="list-style-type: none"> <li>• Renovation or demolition of building</li> <li>• Improper SPF type for application</li> <li>• Trimming and cutting (after the cure time recommended by the manufacturer)</li> <li>• Poor surface finish or slope (roofing)</li> <li>• Mechanically-damaged SPF</li> <li>• Re-roofing</li> </ul>
Category II	Partially-cured SPF	<ul style="list-style-type: none"> <li>• Cutting and trimming (before the cure time recommended by the manufacturer)</li> <li>• Defective SPF (shrinking, cracking, scorched )</li> <li>• Improperly-mixed or off-ratio</li> </ul>
Category III	Severely damaged SPF	<ul style="list-style-type: none"> <li>• Fire</li> <li>• Flood</li> <li>• Mold and mildew</li> </ul>

### Personal Protective Equipment and Ventilation

Personal protective equipment (PPE) as well as adequate workspace containment and ventilation is frequently used during SPF removal to minimize the spread of and exposure to nuisance dust and mitigate potential chemical exposures. Table 2 provides general guidance on the PPE, containment, and ventilation for consideration for the three categories described above.

**Category I:** SPFs in this category are completely reacted, cured and considered to be relatively inert.<sup>2</sup> The PPE recommendations are different than for when applying SPF.

**Category II:** SPFs in this category may not be completely reacted and could present a chemical hazard for those removing and handling the material. The PPE, containment, and ventilation recommendations for Category II SPF removal is the same as the recommendations for when applying new SPF in an exterior or interior application.

**Category III:** Removal techniques of SPFs in this category vary significantly depending on the situation and type of damage. The PPE, containment, and ventilation used would be that recommended by a remediation specialist for the type of damage, such as mold/mildew, or fire restoration.

**Table 2: Safety Equipment for SPF Categories**

Safety Equipment	Category I <sup>1</sup>	Category II <sup>2</sup>		Category III <sup>3,4</sup>
		Exterior	Interior	
Personal Protection				Use PPE, containment, and ventilation as

<sup>2</sup> [http://www.epa.gov/dfe/pubs/projects/spf/exposure\\_potential.html](http://www.epa.gov/dfe/pubs/projects/spf/exposure_potential.html)

Respiratory	Air Purifying Respirator (APR) with N95 particulate (black) cartridge for nuisance dust	Air Purifying Respirator (APR) with N95 particulate (black) cartridge and chemical vapor (magenta) cartridge	Supplied Air Respirator (Full-face mask or hood)	recommended by a remediation specialist for the type of damage, such as mold/mildew, or fire restoration
Eye	Safety glasses with side shields or Safety goggles	Safety goggles		
Hand	Leather gloves	Abrasion-resistant nitrile, neoprene, butyl or PVC gloves	Abrasion-resistant nitrile, neoprene, butyl or PVC gloves	
Skin		Chemical-resistant disposable coveralls, full skin coverage	Chemical-resistant disposable coveralls, full skin coverage	
Hearing (if power tools are used)	Earplugs	Earplugs	Earplugs	
Head	Hardhat	Hardhat	Hardhat	
Feet	Safety shoes	Safety shoes	Safety shoes	
Containment	Plastic Sheeting and masking to create negative pressure containment	None	Plastic Sheeting and masking to create negative pressure containment	
Ventilation	Exhaust ventilation	None	Supply and exhaust ventilation	

1. OSHA Guidelines for Building Demolition
  - a. <https://www.osha.gov/SLTC/constructiondemolition/index.html>
  - b. <https://www.osha.gov/SLTC/etools/hurricane/building-demolition.html>
2. American Chemistry Council’s Center for the Polyurethanes Industry guidance for personal protective equipment (PPE) used during high-pressure spray SPF installation:
  - a. <http://spraypolyurethane.org/PPE>
3. OSHA guidelines for Mold and Mildew Remediation
  - a. <https://www.osha.gov/dts/shib/shib101003.html>
4. Restoration Industry Association (RIA) Guidelines for Fire and Smoke Damage Repair
  - a. <http://www.restorationindustry.org/resources/guidelines>

## Removal Techniques and Tools for all Categories

There are generally two types of SPF as defined by their cellular structure and the removal techniques are different: open-cell and closed-cell. Open-cell (low density) SPF is a relatively flexible material and has a low tensile strength. Closed-cell SPFs, such as medium density insulation and roofing (high density) SPF, are more rigid and have higher tensile strengths compared to open-cell SPF. The different mechanical properties of open and closed-cell SPF require different tools and removal techniques.

### Jobsite Preparation for Both Open and Closed-Cell SPF

Before SPF removal is started, get the ventilation and containment systems in place. In addition to ventilation and containment, understand what objects, such as fasteners, wires, conduit, plumbing, cross-bracing and ductwork may be hidden inside the SPF. For removal of SPF from the underside of a roof deck with asphalt shingles above, numerous sharp nails will be protruding below the roof deck. For removal of SPF from frame walls electrical wires or conduit will be embedded in the SPF. Plumbing and ductwork may be inside the wall cavities as well. All of the items listed above may be present when removing SPF from the underside of a floor.

Before beginning SPF removal, the removal contractor reviews the building plans to identify the locations of the hidden hazards. Use visual inspection to help identify the likely location of AC wires to wall switches and outlets. There are special tools, such as professional-grade stud-finders with pipe and AC wire detection, to help identify hidden metal objects such as wire, conduit and metal piping. Map, trace and mark the locations of these metal objects prior to SPF removal.

Plastic piping, such as PVC and PEX, are not detected by these stud-finder devices. For PVC drain pipes, a metal wire snake can be run into the water drain lines and vent stacks and a metal-detecting stud finder can be used to locate the metal snake. This is not possible with plastic water supply lines so trace the location of these supply lines by observing where water fixtures, such as toilets, sinks and radiators are located.

After the obstacles have been located, and prior to removing SPF, turn off the breakers to the AC circuits and power to other wiring, and turn off and depressurize plumbing and gas lines.

### Open-Cell, Low Density SPF Removal

Due to its low tensile strength and stiffness, open-cell, low density SPF can be easy to work with and remove. Typically a long handled serrated trowel or drywall saw can be used to cut the SPF from the sides of the studs, joists or rafters. Then a long handled, wide-blade putty knife or sidewalk ice scraper may be used to remove the SPF from the sheathing, subfloor or roof deck. Use these tools carefully, especially around embedded obstacles. Remaining chunks of SPF may be removed by a hand scraper or powered wire brush.



### Closed-Cell, Medium Density SPF Removal

The rigid closed-cell structure of medium density SPF creates a material with higher strength and stiffness, which makes cutting and removal more difficult than that required for low density SPF. Power hand tools are necessary except for very small removals. Like low-density SPF, begin by separating the SPF from the sides of the studs, joists or rafters. A reciprocating saw or circular saw can be used. Then separate the SPF from the sheathing, subfloor or roof deck with a sidewalk ice-scraper or spud bar. A hand-held electric power scraper, like those used for tile removal, may be needed.



### Roofing SPF Removal

Removal of roofing SPF, which has a closed-cell structure, is a relatively common operation. Spud bars (long-handled) can typically be used to remove small areas of SPF. For larger areas, there are industrial power scrapers used for floor tile removal that may be used to remove large areas of roofing SPFs.



### Clean-Up

Placed SPF scraps, particulates and dust into heavy-gage plastic garbage bags. Use a shop vacuum to pick up residual particles and SPF dust.

### Surface Remediation

SPF adheres strongly to most substrates, so when SPF is removed it may tear apart in a cohesive manner. This cohesive tearing may leave a very thin layer of SPF on substrates. For Category I SPFs, the layer can generally be considered chemically inert. For Category II SPFs, the residual layer may or may not be fully reacted and an expert onsite can make that determination.

It is possible that unreacted SPF chemicals may be absorbed by certain porous substrates. additional remediation may be needed.

### Encapsulation

Encapsulation is the simplest and generally most frequent option during surface remediation. Encapsulation using vapor barrier paints can be used on SPF residue. Another option is to use sealants used for encapsulation of mold and mildew that can encapsulate chemicals and odors.

### Neutralization

For unreacted A-side residue (MDI), it can be fully reacted with water by steaming the surface with hot water vapor. For odors from amine catalysts, consider using procedures as recommended by the SPF manufacturer or remediation expert. Move up to first sentence Prior to chemical neutralization is performed, consider using a qualified laboratory to measure the indoor air quality or emissions from the residual SPF to determine if neutralization is needed.

### Mechanically Removing

If the building owner requires that SPF residue be removed, consider mechanically removing it. The use of abrasive equipment, such as grinding, brushing or sand/bead blasting, may be needed. This may generate significant levels of dust and a secondary waste to be removed. A technique used for mold removal called cryogenic blasting can be considered as well. Cryogenic blasting is an air blasting procedure that uses crushed dry ice in place of sand to mechanically remove the residual SPF. Typically, the removal of residual SPF results in the removal of a thin layer of the substrate.

Add long-term ventilation - before (in preface) and after removal  
Mac likes this a lot - How long - permanent - category II

### Disposal

Take the removed SPF from the property at the completion of the work and dispose of it properly as required by state and local laws. Check the local laws and regulations, but Category I and Category II SPFs can typically be deposited directly into a landfill. Place Category II SPFs that have unreacted liquids in plastic garbage bags prior to disposal.

If a mechanical recycling service is available, consider sending fully reacted SPF (typically Category I) to the recycling service.

Both Category I and II SPFs are acceptable for chemical recycling and commercial or industrial incineration.

## Disclaimer

This guidance document was prepared by the Spray Foam Coalition of the American Chemistry Council's Center for the Polyurethanes Industry. It is intended to provide general information to professional persons who may be involved in installing spray polyurethane foam. It is not intended to serve as a substitute for in-depth training or specific construction requirements, nor is it designed or intended to define or create legal rights or obligations. It is not intended to be a "how-to" manual, nor is it a prescriptive guide. All persons involved in construction projects including spray polyurethane foam have an independent obligation to ascertain that their actions are in compliance with current federal, state and local laws, codes, and regulations and should consult with legal counsel concerning such matters. The guidance is necessarily general in nature and individuals may vary their approach with respect to particular practices based on specific factual circumstance, the practicality and effectiveness of particular actions and economic and technological feasibility. Neither the American Chemistry Council, nor the individual member companies of the Center for the Polyurethanes Industry, the Spray Foam Coalition of the American Chemistry Council, nor any of their

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### GLOSSARY

A-side, A-component	Polymeric methyl diisocyanate (pMDI). One component of two-component SPF systems.
Adhesive, Adhesion	The bonding of one substance to another or the bonding between applications of the same substance.
B-side, B-component	Blend of polyols and other ingredients composing one component of two-component SPF.
Blister	An uplifting of coating or polyurethane foam caused by an enclosed pocket of gas or liquid entrapped between coating passes, foam and coating, foam and substrate, or within the foam itself.
Cohesive, Cohesion	The bonding of one substance to itself.
Delamination	The separation of layers within a material or materials. May result in blister formation.
Exothermic	Characterized by heat generated by a chemical reaction.
Gap	An unintended, uninsulated or underinsulated area at the edge of an insulated area or penetration of the insulation.
Knit line	The adhesion plane between spray polyurethane foam passes.
Void	An uninsulated space within an enclosed building assembly created when the assembly has been insulated by partial filling of the framed cavity. The partial fill results in an air space (void) between the insulation surface and the assembly's exterior or interior layers.