

## Guidelines for Exterior High-Pressure Spray Polyurethane Foam Insulation Applications Health and Safety Q&A



This document describes general guidelines for exterior (i.e., applications done on the outside of a building) spray polyurethane foam (SPF) application. These guidelines are

different than those used for interior applications where airborne chemical concentrations may accumulate during application. Outside applications tend to dissipate the chemical concentration levels because of large volumes of air.

These general guidelines are intended to supplement specific and detailed information from the spray foam manufacturer (i.e., Safety Data Sheet and Product Data Sheet) that you are using for installation at a job site. Many different variables are present for the various spray foam and coating applications. Evaluate each case individually so that proper risks are identified and the proper protection is used. This document is intended for those spraying, nearby helpers, and those around the worksite where SPF is being installed. Applications such as roofing, exterior duct work, tank insulation, building foundation walls, exterior walls, and many more are typically done in the outside environment. Overspray risk is a reality and must be assessed and controlled during these types of applications. In addition, many of these applications are completed from a position elevated off the ground and fall risks must be managed, in accordance with Occupational Safety & Health Administration (OSHA), with protection provided during the work process and appropriate training provided in advance.

Refer to the Center for the Polyurethane Industry's (CPI) website [www.spraypolyurethane.org](http://www.spraypolyurethane.org) for [additional information.](#)

### What are the chemicals used in SPF?

A-side or "Iso": Is polymeric methylene diphenyl diisocyanate or "pMDI" and typically contains 50% MDI and 50% higher molecular weight oligomers of MDI.

B-side or "resin": Is the polyol blend, and is comprised mostly of polyols, with smaller amounts of catalysts, blowing agents (closed cell foam only), flame retardants, and surfactants.

See the manufacturers Safety Data Sheet (SDS) for more detailed information on the chemicals being used on the worksite.

### What are the potential health hazards of SPF chemicals?

The risks will vary depending upon the task being performed as well as the location or vicinity of the person in relationship to the task being performed. Generally, those doing high pressure spraying will have the greatest risks compared to those who may be away from the spraying and located up wind.

#### A-side

Inhalation overexposure to A-side chemicals can result in 1) irritation of the nose, throat, and lungs, 2)runny nose, sore throat, coughing, tightness in the chest, and shortness of breath, and 3) respiratory tract sensitization (i.e., the development of asthma) with symptoms of chest tightness, shortness of breath, coughing, and/or wheezing. Note that severe asthma attacks can be life threatening. The National Institute of Occupational Safety and Health (NIOSH) notes that "early recognition of sensitization and prompt and strict elimination of exposures is essential to reduce the risk of long term or permanent respiratory problems for workers who have become sensitized."

Skin contact can cause 1) irritation, and 2) sensitization (allergy). Symptoms include reddening, itching, swelling, and rash. Skin contact alone may lead to respiratory sensitization.

Eye contact can cause reddening, tearing, stinging, and/or swelling of the eyes.

See the manufacturers SDS for more detailed information on potential health effects.

## B-side

The B-side formulations for SPF contain five basic chemical classes: polyols, blowing agents, catalysts, flame retardants and surfactants. The B-side chemicals have potential health risk of irritation to the respiratory system, skin, and eyes. Wear the proper personal protective equipment (PPE) when working with polyol blends. See the manufacturers SDS for more detailed information on potential health effects of B-side chemicals.

Due to the potential health hazards mentioned above, it is important to avoid inhalation of, and skin and eye contact with, unreacted SPF chemicals.

## **What are elastomeric weather protection coatings?**

When SPF is applied externally, a protective covering is generally necessary for weather protection of the foam. Typically, the protection is attained through application of an elastomeric liquid-applied coating system, following the manufacturer's recommendations.

The elastomeric coating is a system which cures to form a protective membrane. The protective coating is specifically manufactured for the protection of polyurethane foam as used in exterior applications and can be safely applied in accordance with the coatings manufacturer's instructions.

## **What are the health hazards of elastomeric weather protection coatings?**

The risks associated with the application of elastomeric weather protection coatings are explained in the manufacturer's SDS, written application guidelines, and equipment safety requirements. The

risks associated with the application of coatings or primers are lower when done by brush or roller compared to spray application. This is because spray generally results in possible aerosols present near the exit of the spray gun. Airless paint spray is designed to minimize aerosols compared to air spray processing of paints or coatings. Regardless of the application method, ensure proper PPE is utilized. Refer to the manufacturers' SDS for specific PPE selection. The coating or primer may have a red label on the storage container indicating that these contain flammable materials. Solvents pose a fire risk during the application and curing process. Sparks, smoking or flame sources could lead to accidental ignition and this risk must be communicated and managed during the process. Water-based materials, such as acrylics, do not have this risk, but may not be the appropriate choice for all applications. Each coating has specific traits and is used in various applications as the best choice based upon several factors.

Elastomeric coatings can be wet and slippery when applied. This should be considered and managed, especially when applied to sloped roofs or roof edges to help prevent falls from high locations. This risk must be managed for worker protection. OSHA requirements for fall protection must be followed at all times when working on any roof or surface more than 6 feet above ground per 29 CFR 1926 Subpart M.

## **What type of PPE would applicators wear during SPF and coating application?**

The type of PPE used will depend on the particular activity and the associated potential for exposure. For example, during any spray application, there is potential for skin and respiratory exposure to chemicals from overspray mist and vapors associated with this process. PPE is necessary to prevent exposure. The following suggestions are offered as general guidelines. Always refer to the manufacturers SDS for specific PPE selection.

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**Respiratory Protection:** A NIOSH-approved air purifying respirator (APR) with combination organic vapor/particulate (P100) cartridges, or a supplied air respirator (SAR) should be used as noted below. Respirators should be used and maintained in accordance with your

company's written Respiratory Protection Program (RPP), which is required by the OSHA (29 CFR 1910.134). Among other items, the RPP should include provisions for medical evaluations, fit testing, training, and cartridge change out schedule. Refer to CPI's [Guidance for Developing a Written Respiratory Protection Program](#) available at [www.spraypolyurethane.org](http://www.spraypolyurethane.org)



**Disposable Coveralls:** Take appropriate measures to prevent direct skin contact with SPF or coating application chemicals. Full body coveralls with head covering typically provide the best protection during spray applications. Where heat stress may be a concern, consider the use of lightweight disposable coveralls.

Contact your protective apparel supplier for help in selecting the proper garment to protect the employee from the hazards of the job.



**Disposable Boot Covers:** Wear disposable boot covers or over boots with skid resistant soles. In circumstances where boot covers may create a slip/fall hazard, their use may be omitted.



**Chemical Resistant Gloves:** Wear fabric gloves fully coated with nitrile, neoprene, butyl, or PVC. Alternatively, cotton gloves over disposable nitrile gloves may be used.



**Eye Protection:** When a full face respirator is not used, protect the eyes by wearing safety glasses with side shields or chemical safety goggles. Tinted safety glasses would be preferred for sunny day applications, where clear safety eye protection would be used on cloudy days. It is suggested that you have both available.

## **What type of PPE would a helper wear during application of SPF, and elastomeric coating and primers?**

Helpers directly assisting the applicator (e.g., holding windscreens, hoses, etc.), wear the same PPE worn by the applicator.

## **What type of PPE would be worn during handling of liquid SPF, coating and primer chemicals?**

The type of PPE used will depend on the particular activity and the associated potential for exposure. The following suggestions are offered as general guidelines. Always refer to the manufacturers' SDS for specific PPE selection.

- Eye and face protection if there is potential for splash
- Chemical resistant gloves
- If splash to the body is possible, impermeable protective clothing (e.g., PVC, polyethylene)
- If handling heated SPF chemicals, NIOSH - approved air purifying respirator with combination organic vapor/particulate (P100) cartridges

## **What type of personal protective equipment would be worn during handling of solvents?**

Roof coatings may contain organic solvents. In addition, solvents may be used to prepare the surface prior to application or for cleanup after application is completed. Refer to the manufacturers' SDS for specific information related to the solvents you may be working with.

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## What are the first aid measures?

First aid measures can be found on the SDS. Here are some typical first aid suggestions:

### Inhalation

- Move the individual to fresh air.
- Administer CPR and/or oxygen if needed.
- Seek immediate medical attention.

### Eye Contact

- Flush with lukewarm water for at least 15 minutes. OSHA requires an eyewash or safety shower be provided in the work area where eyes or body may be exposed to “injurious corrosive materials.” OSHA references the American National Standards Institute (ANSI) “Emergency Eyewash and Shower Equipment” Standard Z358.1-1990 that was revised in 2014. The ANSI standard states an eyewash station must deliver “tepid water.” ANSI defines “tepid water” as “[a] flushing fluid temperature conducive to promoting a minimum 15 minute irrigation period.” (29 CFR 1910.151(c))
- Seek medical attention.

### Skin Contact

- Remove contaminated clothing.
- Wash thoroughly with soap and water.
- Seek medical attention if irritation develops or persists.

### Ingestion

- Do not induce vomiting.
- If conscious, rinse mouth with water.
- Seek medical attention.

## What are some good work practices to follow?

- Have the most current SDS for each chemical at jobsite readily available, as required by OSHA 1910.1200 (e.g., keep in the spray rig).
- Prior to the start of each job, it is advisable to have a discussion with the building owner and/or occupant(s) to review the hazards associated with the application, typical measures are followed to ensure those hazards are controlled, any other questions the owner/occupant may have.

- Schedule and coordinate SPF application work in advance of the actual date of application so that other construction trades may take appropriate measures to protect personnel.
- Develop an overspray mitigation plan. Consider the following when developing a plan:
  - Determine in advance the potential for overspray issues.
  - Discuss any overspray potential with the building owner and make necessary arrangements to relocate vehicles.
  - Protect other finished surfaces that could be subject to overspray (e.g., windows, doors, equipment, nearby vehicles, or building exterior finishes) as appropriate.
  - Do not spray SPF or coatings in conditions where wind speeds exceed 15 mph.
  - Use of windscreens in winds less than 15 mph can minimize impact of overspray.
  - Train all employees in overspray prevention.
- Consider Lock-out/Tag-out procedures on HVAC system to prevent accidental restart. Temporarily seal off HVAC (e.g., plastic sheeting and tape) rooftop air intakes.
- Always follow the manufacturer's application instructions with respect to lift (layer or pass) thickness and time between lifts. Spraying foam too thickly in a single lift or not permitting sufficient time between lifts may generate excessive heat to the point where the foam may char, smolder, or burn.
- General housekeeping and cleanup is an important part of the job. Conduct jobsite quality controls before, during and after a project (e.g. warning signs/tape, equipment/material staging).
- Dispose of waste materials in accordance with applicable regulatory requirements.
- Control site access with signage and barricades to ensure the site is free from non-protected workers.
- Develop a fall protection plan in accordance with OSHA 29 CFR 1926 Subpart M App E.

## How may spills be addressed?

To help control an accidental spill and easy clean up consider placing plastic tarps down in work areas where coatings or SPF liquid compounds will be used. If a spill

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occurs, consider the following:

- Direct all personnel away from the immediate area.
- Have individuals trained in spill cleanup don appropriate personal protective equipment.
- Absorb the spilled material with sand, earth or absorbent clays (e.g., vermiculite or cat litter). Place the absorbed material in drums, and do not seal these drums for an appropriate period (e.g., at least 72 hours).
- For PMDI spills, use a neutralization solution (see SDS) to decontaminate the spill surface area (only use the neutralization solution after the majority of the spilled liquid PMDI has been absorbed and placed in a drum).
- If a very large amount of PMDI has been spilled (approximately 10,000 lbs of PMDI, or about fifteen 55 gallon drums), you must report the spill to various local, state, and federal government agencies. In addition, it is advisable to contact CHEMTREC® (1-800-424-9300) for assistance.
- Comply with all applicable federal, state, and local waste disposal regulations, and dispose of accordingly.

## How may empty drums be disposed?

- Offer the empty drums to a qualified reconditioner ([www.reusablepackaging.org](http://www.reusablepackaging.org)).
- Offer the empty drums to a reclaimer for recycling (note: neutralization of empty pMDI drums may be necessary before transferring to a recycler).

- Empty the drums in accordance with the drum reconditioner's or recycler's instructions, as well as in accordance with state and federal regulations.

## Where can I get more information?

American Chemistry Council's Center for the Polyurethanes Industry

[www.polyurethane.org](http://www.polyurethane.org)

[www.spraypolyurethane.org](http://www.spraypolyurethane.org)

Spray Polyurethane Foam Alliance (SPFA)

[www.sprayfoam.org](http://www.sprayfoam.org)

National Roofing Contractors Association (NRCA)

[www.nrca.net](http://www.nrca.net)

Insulation Contractors Association of America (ICAA)

[www.insulate.org](http://www.insulate.org)

U.S. National Institute of Occupational Safety and Health (NIOSH)

[www.cdc.gov/niosh/topics/isocyanates](http://www.cdc.gov/niosh/topics/isocyanates)

OSHA website

[www.osha.gov](http://www.osha.gov)

SDSs and other health and safety literature can be obtained by contacting your SPF supplier.

## Legal Notice

Published October 2015. This document may be updated. For the most current version of this document, see [www.spraypolyurethane.org](http://www.spraypolyurethane.org), or [www.sprayfoam.org](http://www.sprayfoam.org).

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