Spray Foam - Frequently Asked Questions

Many calls to the SPFA Hotline are from design professionals and building owners requesting general information about SPF. Here are typical questions we receive:

1. **What are the differences between open-cell vs. closed-cell SPF insulation?**

   There are two general categories of SPF insulation materials; open-cell, low-density (a.k.a. ‘half-pound foam’) and closed-cell, medium-density (a.k.a. ‘two-pound foam’). Both foam categories provide excellent insulation and air sealing. Although both are made using almost identical chemical reactions, there are some inherent physical property differences that often determine which product is chosen for a particular project.

   Open-cell spray foam (ocSPF) has an open cell structure where the cells are filled with air. The open-cell structure renders soft, flexible foam, with a density of about 0.5-0.8 pounds per cubic foot (pcf). Still air is the primary insulation medium in ocSPF, fiberglass and cellulose. These insulations work by reducing the natural air movement within these materials thereby reducing the ability of the material to conduct heat. The R-value per inch of open-cell foam typically ranges from R3.6 to R4.5 per inch. Unlike fiberglass and cellulose, the fine cell structure of ocSPF makes it air-impermeable at certain thicknesses. The air-impermeability of ocSPF qualifies it as an air-barrier material, dramatically reducing air leakage through the building envelope, significantly lowering the building’s heating and cooling costs. ocSPF, like fiberglass and cellulose insulations, is moisture-permeable, and may require the installation of a vapor retarder in colder climates. .

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Closed-cell spray foam (ccSPF) has a closed cell structure which yields a rigid, hard foam, with a density of 1.8-2.3 pound per cubic foot (pcf), and has been demonstrated to provide structural enhancement in certain framed buildings. These smaller cells trap an insulating gas, called a blowing agent. This blowing agent has a lower thermal conductivity than still air, and increases the R-value. Typical R-value per inch of closed-cell foam ranges from R5.8 to R6.9* per inch, making it a great choice in applications where clearance is limited. Like ocSPF, ccSPF is also air impermeable at certain thicknesses and and can qualify as an air-barrier material. The closed-cell structure of ccSPF makes it water-resistant, and is the only spray foam that can be used where contact with water is likely (e.g., below-grade concrete walls, in contact with the ground, or on exterior side of the building envelope). At a thickness of 1.5 inches, ccSPF has a moisture permeance typically less than1.0 perms and no additional vapor retarder is required for most applications.

**Consult product data sheets*

2. **Does SPF absorb water?**

   Closed-cell foams, by nature, are resistant to water absorption, and are approved by FEMA as a flood-resistant material. Open-cell foams can absorb and retain liquid water at varying rates. It is important to consider the different properties for each foam type for each application.

3. **How can I find a local SPF contractor?**

   SPFA has a list of Member Contractors on its website committed to quality and safety. Click on the Membership link on the upper left side of the www.sprayfoam.org home page. Then click on the Directory link at the top center. Select State from the dropdown list, and select Contractor from the Member Type list and then click Search. SPF is a versatile material and can be used in a number of different applications. Some contractors specialize in certain SPF applications such as residential insulations, commercial insulations, low-slope roof systems and industrial/agricultural applications. You will need to contact each of them to discuss your specific needs. If you cannot find a local contractor, perform the search again with no state selected and then select Material Supplier from the Member Type dropdown list. Click Search. This will provide a listing of

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national SPF suppliers. Call any of these suppliers to find a local contractor in your area.

4. **How can I get started as a spray foam contractor?**

   If you are a roofing or insulation contractor, or your company provides other construction services and is interested in adding high-pressure SPF to your portfolio, it is important to understand that this is a highly technical application. The best first step is to contact a Material Supplier, Distributor or Consultant specializing in applicator training from our online Directory. These companies can provide information regarding training requirements, knowledge of the chemicals being used as well as hazards associated and information on capital equipment costs. SPF application requires advanced knowledge, skills and abilities that can be obtained from a combination of supplier and distributor hands-on equipment training and the SPFA Certification program. Improper application of the product can result in chemical exposure to the applicator, as well as the occupants of the structure being insulated. **Application of the product without proper training is not recommended.** Participation in the SPFA Certification program is strongly recommended.

5. **Does SPF emit volatile organic compounds after installation?**

   During application, SPF, like most site-applied building materials, will release small amounts of chemical compounds into the air. Each manufacturer will provide a time for re-occupancy after completion of the application. SPF materials and coatings can also give off odors that may be noticeable by some people, but with proper ventilation, these odors should subside. Several SPF products have been independently tested (ULe GreenGuard, CAN-ULC 774, CA 01350) for release of volatile organic compounds, and no significant levels have been measured after the prescribed cure periods. One study performed by the American Medical Association, assessed the toxicity of a number of foam plastic insulation products and concluded that fully-cured polyurethanes present no toxicity problems for humans (the Journal of The American Medical Association, Vol. 245, No. 3.).

6. **What fire protection measures (thermal or ignition barriers) are required for SPF?**

   SPF, like many construction materials, is combustible, and can ignite when subjected to heat or flame. For this

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reason, model building codes require that SPF materials (with some exceptions) must be separated from interior (occupied) spaces by a 15-minute thermal barrier, such as ½" gypsum board. In limited access areas like crawlspaces and attics, an ignition barrier may be permitted in place of a thermal barrier. Prescriptive thermal and ignition barriers are defined in the model building codes, and alternative coatings,coverings and assemblies may be used. For more information on thermal and ignition barriers, please see SPFA guideline AY-126 from our Technical Documents section on www.sprayfoam.org.

7. **How much does SPF cost?**

   As a trade association, SPFA, by law, cannot provide information on material or installation costs. In general terms, the installed cost of SPF insulation is greater than that of fiberglass or cellulose insulations, but SPF provides many extra benefits including air barrier and vapor control, as well as improved structural performance. The installed cost of SPF roofing systems is competitive with other roofing systems. Contact a local contractor for an estimate for specific requirements.

8. **What are the structural benefits of closed-cell SPF**

   Because of its rigid nature and ability to adhere to many materials, closed-cell SPF (ccSPF) can provide structural enhancement to framed buildings. Racking strength of certain framed walls, as well as uplift strength of framed roof decks can be significantly increased with the addition of just 2-3 inches of SPF. For more information, please contact SPFA to obtain detailed reports.

9. **How do I know a SPF contractor is properly trained or certified?**

   Before hiring a SPF contractor, always be sure that the applicator on the jobsite is properly trained. At a minimum, the applicator should have completed a two or three day equipment and materials course provided by the SPF Material Supplier or Distributor. All members of the SPF crew should have completed the Online Health and Safety Training for SPF, provided by the Center for the Polyurethanes Industry (CPI) at www.spraypolyurethane.com . Additionally, you may want to consider a contractor with advanced training offered by the SPFA Roofing or SPFA Building Envelope Certification Programs.

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10. **How can I get more information about non-construction applications of polyurethane foam?**

    SPFA represents the segment of the polyurethane foam industry for on-site construction applications of insulation, roofing and air-sealing systems for buildings. If you have a question or application about polyurethane foam that is not directly related to building construction, we suggest that you contact one of our Material Supplier members using our online Directory. Many Material Suppliers provide polyurethane foam for non-construction applications, and may be able to provide specific materials or advice in these areas.

11. **Is SPF suitable for residential retrofit insulation applications?**

    SPF is an ideal product for insulating and air-sealing existing homes. SPF can be used to create energy-saving unvented attics and crawlspaces that seal against air leakage and bring under-insulated and leaky HVAC ducts inside the conditioned space of the building. In addition SPF, can be used to insulate and air-seal band and rim joist areas where the framing meets the home's foundation.

12. **Should access to the work area be restricted during and immediately after spray foam installation?**

    During and immediately following spray foam applications, fumes and mists are generated that can be hazardous to your health. Access to the work area during this time should be restricted to personnel wearing appropriate personal protective equipment (PPE), including respirators, and whose job responsibilities require them to be in the area.

13. **How soon can buildings be re-occupied after SPF installation?**

    The application of SPF can produce hazardous levels of airborne chemicals during and just after installation. These chemicals, most notably MDI, will degrade into non-hazardous compounds in a few hours when combined with moisture in the air. Because of these short-term airborne levels, re-occupancy of the work area by other trades or building occupants is typically 24 hours. However, specific re-occupancy time may vary depending on type of material, volume of mists and fumes generated, building size and rate of ventilation. Your contractor and their supplier can recommend re-occupancy times based on job specific conditions. For more information on jobsite re-occupancy, please refer to the American Chemistry Council's Center for the

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Polyurethane Industry (ACC-CPI) website: http://www.spraypolyurethane.org/Reoccupancy

14. **What is the difference between low-pressure and high-pressure SPF application?**

    Low pressure SPF applications fall into two categories, sealant foam and insulation foam:

    1. **Low Pressure Sealant foam** consists of one-component aerosol cans and two-component spray foam kits.

       One-component SPF aerosol cans typically hold from 0.5 to 2 lb. of SPF and are used for sealing cracks, crevices and small holes. They are available at retailstores and are popular for do-it-yourself (DIY) projects.

       Low pressure two-component kits consist of small A- and B-side pressurized cylindersconnected to plastic hoses and a disposable spray nozzle or gun. They are most commonly used by SPF contractors for air sealing,patching and repairing of small areas of spray foam (up to 100 bd. ft). The two-component kits can range from 5 to 30 lb. of material.

    2. **Low Pressure Insulation SPF** systems consist of refillable cylindersof A- and B- components in sizes ranging from 50 to 100 lb. of material. The cylindersare typically pressurized to around 200 to 250 psi with a pumping capacity between 10-15 lb. per minute with a maximum hose length of up to 200 feet. Most systems are unheated and use equipment specific to the SPF system.

    High Pressure SPF systems consist of A-and B components being transferred from unpressurized 55 gallon drums or larger tanks and pumped through a proportioner that heats and pressurizes the materials. The materials reach pressures ranging from 800 to 1500 psi and temperatures of 100-140°F as they pass through heated hoses and are mixed at the spray gun. Pumping capacity varies considerably depending on the size of the proportioner and can range from 10 lb. per minute to more than 45 lb. per minute throughhose lengths up to 350 ft.

15. **Can SPF be used as an air barriers?**

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Spray foam, when applied to certain minimum thicknesses (about 1.5” for closed-cell foam and 3.5-5.5” for open-cell foam) will form an air-impermeable, air-barrier material. When properly installed in a well-designed building envelope, SPF plays a key part in creating air barrier assemblies and systems. For more information on air barriers, visit the Air Barrier Association of America (ABAA) at www.airbarrier.org. ABAA provides a material specification for SPF under ABAA document 07263.

16. **Can SPF be used with Other Insulations (Hybrid Insulation Systems)?**

    Closed-cell SPF can be used in combination with other insulation materials such as fiberglass, cellulose and foam board products. These cost-effective hybrid systems use SPF to insulate and air seal, and use other insulations to provide assembly R-values that meet energy codes. In colder climates, special design considerations are needed to address potential moisture condensation issues. For more information on using SPF in hybrid insulation applications, see SPFA’s guidelines on hybrid systems: AY-146 Spray Polyurethane Foam for Hybrid Insulation Systems - Climate Zones 1-3 and AY-147 Spray Polyurethane Foam for Hybrid Insulation Systems - Climate Zones 4-7

17. **Is SPF permitted by the building codes?**

    The use of SPF insulation and roofing systems is permitted by the international model building codes published by the International Codes Council (ICC). SPF is a type of foam plastic, which is specifically addressed in the International Building Code (IBC) Section 2603, and in the International Residential Code (IRC) Section R316. These sections of the model building codes focus on fire protection requirements for safe installation of these materials. Many SPF products have third-party code compliance evaluation reports that detailhow specific products may be installed to meet the model building code requirements. Although ICC provides model building codes, states and local jurisdictions accept different editions or may make changes to these codes before adoption Always check with your local building department to confirm which version of the code is being used and specific requirements for the use of SPF. For copies of or more information about the model building codes, they may be available at your local public library or visit www.iccsafe.org.

PROBLEMS

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Problems with SPF installation should be resolved between the building owner (customer) and SPF contractor that installed the foam. If these issues cannot be resolved at this level, the building owner should contact the supplier of the foam and/or coating systems. Below is a list of typical installation and service problems.

1. **Does SPF emit odors?**

   Some SPF materials may give off a noticeable odor for several days after application. These odors, noticed by some people, are usually caused by unreacted amine catalysts, and have been described as smelling like fish, cat urine or fresh latex paint. They are not indicative of a chemical hazard, but can be a general nuisance. Supplementary ventilation of the work area for a few days is recommended to reduce these odors. If other odors are present or persistent, or the foam is discolored or inherently sticky, or friable, these are symptoms of an improperly installed foam. In this event, contact the SPF contractor.

2. **Can spray foam shrink?**

   When improperly applied, some SPF, particularly closed-dell foams, products may shrink and pull away from structural members. Improper equipment settings or excessive pass thicknesses can result in foam shrinkage. While isolated amounts of shrinkage can occur, the number and size should not be extensive. Cracks and gaps caused by shrinkage can compromise the air sealing performance of the SPF, and could result in moisture condensation problems in colder climates. Extensive shrinkage should be repaired.

3. **What causes delamination and adhesive failures with SPF?**

   Much like painted coatings, SPF should strongly adhere to nearly all construction materials that are clean, dry and free of oils and grease. If the substrates are free of oil, dust, dirt and moisture, and applied according to manufacturer’s instructions, there should be no problems with SPF adhesion. Adhesion should be occasionally checked by tearing a small area of foam from the substrate. When properly adhered, the foam itself should tear, leaving a thin but visible residue of foam on the substrate. However, SPF may not adhere well to some construction materials, such as polyethylene sheeting, under-cured concrete (containing excessive moisture or surface contaminants) and certain metals. These materials may need special surface treatments, such as

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primers or coatings, before SPF can be applied.

4. **What is SPF overspray?**

   SPF applications, especially high-pressure foams, will leave a coating of fine droplets on all surfaces near the work area. Depending on the surface material, these fine droplets may not be easily removed. It is impossible to completely remove SPF overspray and residue from most porous surfaces. On smooth surfaces, SPF overspray may be mechanically removed using buffing and polishing compounds. SPF cannot be dissolved using most common solvents. All finished surfaces, and especially smooth surfaces such as glass, porcelain and metal, should be thoroughly masked prior to application.

5. **Will hail cause damage to low-slope SPF roofs?**

   SPF roofing systems, like all roofing products, can be susceptible to hail damage. Hail damage can leave dents in the foam, and can compromise the protective coatings used on SPF roofs. This damage is repairable. Please consult the SPFA guideline for evaluation and repair of SPF damaged roofs, AY-139.

6. **How can SPF roofs be repaired and maintained?**

   An SPF roof, when regularly inspected and recoated every 5-20 years, can easily last the lifetime of the building. Regular annual inspections of SPF roofs are suggested to identify damages areas, drainage problems and evaluate the condition of the coating.

7. **Can SPF roofs be recoated?**

   SPF roofs systems require a protective coating over the foam to protect it from ultra-violet light and routine surface damage. Depending on climate, the type of coating, and the total coating thickness, these coatings may last from 5 to 20 years. Regular inspections should be performed to determine with a recoating is needed.

8. **Is SPF susceptible to mold and mildew?**

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All building materials, when installed to create a building envelope assembly, work interactively as system, to control the movement of heat, air and moisture. When not properly designed or installed, moisture can move through the building envelope and condense on cold surfaces that are below the dewpoint temperature or create high levels of moisture. This moisture, at certain temperatures, in the presence of organic food sources (paper, wood, bacterial dust, etc.) can provide the conditions necessary to promote the growth of mold and mildew. While SPF is not a source of food for mold, mildew and bacteria, organic dusts can collect on the surface of the foam. In combination with moisture at the right temperatures, these organic dusts can result in mold and mildew. SPF, like all insulation products, can result in mold and mildew problems in building envelopes that are poorly designed or constructed. Proper air sealing, as well as use and placement of vapor retarders, and sufficient levels of insulation are key to proper building envelope design.

9. **What is a chemical exotherm, and how can it cause damage?**

   The chemical reaction used to create polyurethane and polyurethane foams give off heat, which is called an exothermic reaction. Closed-cell SPF products, when installed at pass thicknesses exceeding manufacturer's recommendations, can generate excessive heat that can be trapped inside the foam. This heat can results in poorly formed foams that dramatically reduce coverage rates and diminish product performance, causing loss of R-value or shrinkage. In extreme cases, where closed-cell foam is applied at thicknesses several times the manufacturer's limits, can generate enough heat to self-ignite the foam. The SPF contractor should always follow manufacturer's installation instructions regarding pass thickness and times between passes to eliminate damage caused by exothermic reactions.

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