Frequently Asked Questions About Spray Polyurethane Foam (SPF)
The following list of questions and answers address some of the most common topics found within the spray polyurethane foam (SPF) industry. The information in the proceeding document should be used when interfacing directly with architects, builders and home and building owners.

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Should additional information be required, please contact Huntsman at sprayfoam@huntsman.com.
G. 1 | **How is spray polyurethane foam (SPF) made?** SPF is made by reacting MDI (A-side or iso) with a polyol blend (B-side or resin). The result is a foam matrix.

G. 2 | **How is SPF applied?** The A-side and B-side are mixed under pressure and sprayed onto a surface – wall, wall cavity, roof sheathing, etc. Once the reacting liquid hits a surface, it expands 30 to 120X and solidifies into a foam matrix.

G. 3 | **How does it work?** SPF is an insulation product that seals and protects the interior environment from infiltration of hot air, cold air, moisture and sound. Its R-value reduces conductive heat transfer. Additionally, it creates a seamless air barrier and lowers the impact of radiant heat transfer.

G. 4 | **How does SPF work versus traditional fibrous insulation products?** Traditional fibrous insulation products are not air barriers. SPF creates a seamless air and thermal barrier, making it an effective insulation product. In addition, it should not degrade, settle or sag over the life of a building.

G. 5 | **What are the different types of SPF?** There is open cell SPF (1/2lb./ft.³ density) and a closed cell SPF (2lb./ft.³ density).

Open cell SPF has an R-value of 3.7 per inch. It insulates by trapping air in the foam cells. It acts as an air barrier and noise absorber. Open cell SPF is softer and more flexible than rigid closed cell foams, and, in general, is best suited for mixed or warm climates.

Closed cell foam has a higher R-value (over 6 per inch), and is an excellent air and moisture retarder. It provides structural enhancements to buildings where it is sprayed, and is effective in all climates. In cool climates where the moisture drive is from the inside to the outside of a building, closed cell SPF can help eliminate condensation on the sheathing, thus helping to prevent the growth of mold in these areas.

Open cell SPF typically has a lower installed cost per square foot compared to closed cell SPF.

G. 6 | **Is SPF more expensive than traditional fibrous insulation? Will using it drive up the price of a building?** When only the initial costs are taken into consideration, SPF is more expensive than traditional insulation products. However, when the energy savings and the reduction in other building component costs (e.g., heating, ventilation and air conditioning (HVAC) equipment) are considered, SPF is a worthwhile investment. Various studies have shown home or building owners recover their initial costs within 1 to 5 years.

G. 7 | **Is there any return on investment (ROI) data related to SPF versus traditional fibrous insulation products?** ROI varies from region-to-region based on insulation costs, energy costs and climate. Typical homeowners who upgraded from fiberglass or cellulose to SPF may realize a 30 to 50 percent reduction in energy costs. On a case-by-case basis, payback can be estimated by using modeling software. For examples of case studies that highlight the energy saving potential of SPF, please visit www.sprayfoam.org.
G. 8 | How does SPF affect indoor air quality? SPF restricts the infiltration of unwanted allergens and pollutants, e.g., pollen and dust. Some types of closed cell SPF are GREENGUARD Indoor Air Quality Certified® and GREENGUARD Children and Schools™ Certified.

The best air quality is achieved in an ultra-tight house with controlled ventilation. It is important to “build tight, ventilate right” and to follow the ASHRAE 62.2 Residential Ventilation Standard. In addition, humidity should be controlled by selecting and sizing the proper HVAC equipment.

Polyurethane foam insulation is used in a variety of applications, including sofa cushions, mattresses, appliances and more.

G. 9 | How is healthy indoor air quality maintained in a tight home with SPF? If the house has a very tight building envelope, fresh air must be introduced mechanically into the HVAC system. The amount of fresh air being supplied should meet the ASHRAE 62.2 Residential Ventilation Standard on indoor air quality. This calculation can be provided by an HVAC contractor.

G. 10 | What are the environmental effects of SPF? SPF reduces energy consumption and electricity usage in buildings by preventing air infiltration. According to the U.S. Department of Energy (DOE), air infiltration can account for 30 percent or more of a home’s heating and cooling costs.

Lower electricity demand results in reduced carbon emissions from the fossil fuel plants used to produce electricity. According to McKinsey Consulting, 233X more carbon dioxide emissions are saved when foam plastics are used as building insulation, compared to the carbon dioxide emissions generated in manufacturing foam plastics.

SPF has no known negative effects on the indoor air quality. Some types of closed cell SPF are GREENGUARD Indoor Air Quality Certified® and GREENGUARD Children and Schools™ Certified.

G. 11 | How does SPF perform against insects? SPF can help to keep insects out of a building by sealing all the cracks and crevices. It does not repel or keep burrowing insects, such as termites, from tunneling through the SPF to get to food sources. SPF is not a source of food for burrowing insects. In heavily infested areas, insects will tunnel into the SPF and use it as a shelter. Standard pest control techniques should be followed for each specific region.

G. 12 | Are SPF manufacturers required to meet certain standards for per-inch R-values? Why do per-inch R-values vary? Yes, please refer to the R-value Rule (FEDERAL TRADE COMMISSION 16 CFR Part 460 — Labeling and Advertising of Home Insulation: Trade Regulation Rule). Please refer to the manufacturer's technical data sheet or the ICC-ES report for stated R-values.
G. 13 | Does the R-value of SPF change over time? The R-value of open cell SPF does not change over time. Closed cell SPF undergoes an initial aging period in which its R-value slightly decreases. After the initial aging period, the aged R-value remains stable over the life of the foam. Per the R-value Rule, most manufacturers report the aged R-value of closed cell SPF.

G. 14 | Are there differences in fire and safety performance for open cell versus closed cell SPF? Both open cell and closed cell SPF are polyurethane foam plastics and have similar fire performance. Building occupants must be protected from foam plastics with 15-minute thermal barriers, e.g., gypsum board, as required by the local building code. In areas with limited access and occupancy, an ignition barrier is acceptable. Ignition barriers include 1/4-inch plywood, gypsum or intumescent coatings.

G. 15 | Does SPF meet flame spread and smoke development tests? Building codes require ASTM E-84, Class II fire performance for foam plastics (<75 flame spread and <450 smoke). Most types of SPF are rated Class I (<25 flame spread and <450 smoke), exceeding the building code requirements. Check with the SPF manufacturer.

G. 16 | What kind of off-gassing does SPF produce and how does it work when retrofitting a building? The off-gassing associated with all SPF occurs during the spraying and immediately afterwards. Once the reaction is complete (within seconds), the concern is minimal. To address this issue, SPF should only be applied by a professional SPF applicator. If the area sprayed is properly ventilated, then it can be occupied within 24 hours.

G. 17 | Does SPF have volatile organic compounds (VOCs) content? No.

G. 18 | Is SPF completely chlorofluorocarbons (CFCs) free? Chlorofluorocarbons were banned in the Montreal Protocol, as they are substances that depleted the ozone layer. Open and closed cell SPF do not contain CFCs. Closed cell SPF contains hydrofluorocarbon (HFC) blowing agents, which have zero ozone depleting potential. Open cell SPF utilizes water as its blowing agent.

G. 19 | In the early 1980s, urea-formaldehyde foam insulation (UFFI) was used extensively. It was later found to off-gas formaldehyde gas. Is there any concern that the same could occur with this insulation? No. SPF insulation is NOT urea-formaldehyde foam insulation. There is no added formaldehyde in the SPF used today. (Please refer to Question G. 16.)

G. 20 | Can SPF be considered a “green product?” Yes, SPF can be considered a green product, in that it saves energy in buildings and reduces carbon dioxide emissions. (Please refer to Question G. 10.)
G. 21 | What are the different climate zones? See map below.

Source: DOE

G. 22 | What is the proper personal protective equipment (PPE) that must be worn by both the applicator and the assistant(s) when applying or assisting with the application of SPF to the inside (interior) of a building, using high-pressure dispensing equipment and/or during all trimming and clean-up activities?

- A NIOSH-approved, full-face or hood-type supplied air respirator (SAR) operated in positive pressure or continuous flow mode must be used
- Fabric gloves fully-coated with nitrile, neoprene, butyl rubber or PVC
- Disposable coveralls with an attached hood and disposable over-boots with skid-resistant soles
- Steel-toed work boots, covered by disposable over-boots (as needed)

G. 23 | What is the proper personal protective equipment (PPE) that must be worn by both the applicator and the assistant(s) when applying or assisting with the application of SPF to the outside (exterior) of a building, using high-pressure dispensing equipment and/or during all trimming and clean-up activities?

- A NIOSH-approved, full-face or half-face, air purifying respirator (APR) with an organic vapor/particulate (P100) cartridge. A half-face APR must be used in conjunction with safety glasses with side shields or chemical safety goggles.
- Fabric gloves fully-coated with nitrile, neoprene, butyl rubber or PVC
- Disposable coverall and disposable over-boots with skid resistant soles
- An approved hard hat must be worn in areas where there is a risk of falling objects
- Steel-toed work boots, covered by disposable over-boots (as needed)
References

Design Right and Build Strong Webcast, July 16, 2008

Surviving the Downturn: Selling Affordable, Energy-Certified Homes, Featuring Spray Foam Insulation Webcast, July 22, 2009

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