



SPRAY POLYURETHANE FOAM (SPF) COMPARED TO CONVENTIONAL ROOF SYSTEMS

Spray polyurethane Foam roofing systems (SPF) has been around since the 1960s. Since that time,, they have consistently outperformed traditional roofing systems like Built-up Roofs Systems (BUR) and single ply roofs. So why aren't more people opting for a spray foam roof over a conventional roof? Well, it's largely due to people's misperceptions about spray foam roofing systems. Spray Polyurethane Foam (SPF) is not a new product on the market for eco-conscious owners and businesses, but is a true and proven roofing system that has provided the highest performance and customer satisfaction of any roofing system on the market today.

These are summaries of two studies that highlight the major benefits of spray foam systems over traditional roofing systems.

Texas A&M

In the early 1970's Texas A&M got weary and frustrated of the leaks and maintenance issues they had to deal with on over 7-million square feet of conventional BUR roofing. After conducting extensive research, the university decided to install a Spray Polyurethane roof system on campus. Between 1980 and 1984, the university monitored the energy savings on building with SPF roofing and learned that the SPF completely paid for itself over a period of 4.5 years (on average). Today the university has many buildings with foam roofing systems that are well over 30 years old; these buildings continue to be leak free and energy efficient.

University of Arizona Study

University of Arizona's performance Based Studies Research group has been analyzing high-performance roof systems since 1984. Their program identifies quality low-slope roofing systems that meet or exceed the 20 year life expectancy of traditional roofing systems with 98% customer satisfaction and 98% of roofs that don't leak when randomly sampled every year. To date, Spray Polyurethane Foam (SPF) is the only roofing system to meet the high standards of their program after studying 50 SPF roofs in the Houston area. The study was conducted by Dr. Dean Kashiwagi. There was a 98% customer satisfaction.

Why the Spray Polyurethane Foam (SPF) roof can hold up when other roofing systems don't.....

Typically, the roof is the most vulnerable part of the building subject to damage from high wind disasters. Once the roof goes, the interior of the building is exposed to the elements. In fact, water damage to a structure and its contents is often ten times more costly than the damage to the roof itself. That's why it's important to cover your building with a roofing system that can hold up to the punishing blows of high winds.

After hurricane Hugo and Andrew, teams of roofing experts visited the storm -ravaged areas to survey the devastation. They discovered that Built-up membrane roofing (BUR) systems failed to protect many of he buildings which sustained damage.

Generally, the reason for failure is the very nature of the BUR design with overhangs, overlaps, joints, exposed edges and flashings. The wind grabs an edge of the roofing material and lifts it off the deck or literally peels back portions of the membrane. This was made easier because many of the BUR systems were not adequately fastened to the deck. Once the roof was blown away or penetrated, rain poured in and ruined the building's contents.



By contrast, the Spray Polyurethane Foam roofing (SPF) systems inspected held up under high hurricane force winds. The buildings with SPF remained dry and intact. That's because a properly installed SPF roof system is a smooth, monolithic system that grips the deck and building walls. It adheres so tight that there is no need for fasteners. It is seamless and self-flashing so there are no joints or edges for the wind to hold onto. Based on comparison of performance, the application of the Spray Polyurethane Foam Roof System provided enhancement to the uplift capability when compared to Built-up roof systems.

The Spray Polyurethane Foam Roof System is light-weight, yet rigid—it provides extra strength to help the roof stand up to the forces of nature. It is also resilient enough to resist missile damage. During high winds SPF roofs are pelted and penetrated continuously with debris of varying sizes resulting in no leakage because of the close cell structure. There is no lateral movement of water within the foam and because it grabs to the deck water cannot travel between the base of the foam and the substrate. Typically when a BUR system is penetrated, there is lateral movement of water between the layers and at the substrate causing immediate damages inside the building.

Hail Impact and effects

Spray Polyurethane Foam has been found to perform above average as compared to other conventional roofing system in withstanding hail impacts and hail-related damage and failures. Recent studies of comparative roof performance have included Hail Damage to Roofing (W.C. Cullen-NRCA) another recent report sponsored by the National Roofing Foundation, surveyed 140 SPF roofs ranging from new to 27 years old. Among the report's conclusions in terms of hail effect was that SPF roofs help prevent the roof leaking associated with hail storms. "They are not in immediate danger of leaking" reads the report. The report also concluded that where roofs had experienced hail damage, the impact penetration was limited to the "Upper Surface" This performance attribute demonstrates the ability of SPF roofing assemblies to protect roofing substrates during hail events – and, for the same reason, building contents and occupants.

The performance of the spray applied polyurethane foam roofs that were inspected after the hurricanes was found to be outstanding. If the substrate is adequately anchored, these roof systems appear to offer great wind resistance. The SPF roof systems do not exhibit a tendency to progressively fail after being impacted by missiles as compared to conventional BUR systems. Spray polyurethane Foam roof systems appear to be quite resistant to water leakage after missile impact. (Thomas L.Smith, AIA- NRCA)

The Benefits of SPF building systems include high levels of R-Value, as well as the providing of integral air barriers and assistance in moisture control. For roofing, SPF is highly insulating and can eliminate the thermal bridging through fasteners and gaps in the decking system. Recoating SPF roofs or covering over other roofing types is a proven and cost-effective retrofit method.

Because the physical properties of the SPF change little with age, SPF roofs have been in place for as long as 30 years. The durability of an SPF enclosure depends primarily on the original installation and long term maintenance. SPF roofs, for example, should be inspected twice per year and after any events that could damage the membrane. SPF adds little weight and can adhere to a variety of substrates, such as built-up roofing (BUR), modified bitumen, single ply and other type membrane systems, sheet metal, ceramic tile, concrete, wood, tectum and gypsum.



SPF can be used to add slope and fill in depressed areas on the roof surface eliminating complicated tapered rigid board insulation in multiple layers with varying lengths of fasteners. SPF is a good specification and installation choice where:

- Additional insulation is desired.
- The roof substrate has many penetrations.
- The roof deck is an unusual shape or configuration.
- Lightweight materials are required.
- Slope must be added to provide positive drainage.

Is SPF Roofing System Sustainable?

Oak Ridge National Laboratories described sustainable or green roofing systems as “**roofing** systems that have a long life, low maintenance, save **energy**, add durability to buildings, control moisture in buildings, and contribute very little to the waste stream. SPF roofing system complies with every criteria of this definition. SPF roofing system greatly reduce tear-offs in many re-roofing projects, which also decreases the amount of materials entering the waste stream. In addition, the SPF systems used today do not contain any ozone –depleting chemicals, and the energy saving characteristics can save considerable amounts of fossil fuel and co2 production, which affects global warming. SPF roofing system arrive on the job site in 55- gallon drums, the foam plastic expands 30 times its original volume on site. This saves greatly on fuel used for transportation.

The need for multiple roofs makes roofing one of the largest contributors of solid waste. According to the NRCA more than 68.5 percent of the \$ 11.3 billion low-slope roofing market includes tear-off and replacement of existing roof membrane.

Summary:

SPF roofing benefits:

- Over 30 years of performance history
- Conforms to unusual substrates
- High thermal resistance per unit thickness
- Seamless or monolithic construction
- Tenacious adhesion
- 2.5 – 3.0 density
- Ultra lightweight (less than 1psf for a 3-in thick foam plus coating)
- Self flashing
- Class A fire rating
- FM approved
- Miami Dade Approved
- No lateral water migration because of the close cell structure
- Avoid costly tear-off
- Eliminates thermal bridging
- Eliminates ponding water thus extending the life span of the roof system.

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