Spray Polyurethane Foam Insulation
Creating Cost Effective, Energy Efficient, Green Buildings
What is Spray Polyurethane Foam?

Spray Polyurethane Foam (SPF) is an insulation product that is spray-applied in situ at a building site. Two liquid components, MDI (A) and polyol blend (B) are mixed under pressure and sprayed onto a roof or wall cavity. The reacting liquids expand and solidify into a foam matrix creating a seamless seal. SPF adheres well to the area it is applied to, providing an air barrier that prevents thermal leaks.

Types of SPF

Spray Foam comes in two forms:

Closed-cell foam (sometimes known as two-pound or medium density foam) has a high R-value of around 6 per inch. It acts as an air and vapor barrier. It also provides structural enhancement.

Open-cell foam (sometimes known as half-pound or low density foam) has an R-value of 3.6 per inch, and may act as an air barrier. It also acts as a noise absorber.

The Only Complete Insulant

A building functions to protect its occupants against the exterior environment. Insulation and air-tightness are two of the most important components of a building’s protection against outside conditions.

Building components interact as a system to control the flow of heat, air, moisture and sound into and out of a building. SPF is the only complete insulant that controls against these elements. With SPF, building owners have lower utility and maintenance bills, better health and a more comfortable interior environment.

- **SPF as a Thermal Insulant**
  - High R-value
  - Does not settle or sag with time
  - Reduces or eliminates thermal bridging effect

- **SPF as an Air Barrier**
  - Low air permeance
  - Completely seals wall penetrations
  - Prevents drafts and hot-spots

- **SPF as a Moisture Barrier**
  - Prevents moisture penetration
  - Eliminates dewpoints in the wall cavity
  - Controls mold problems

- **SPF as a Sound Barrier**
  - Air seals to absorb sound at varying frequencies
  - Dampens sound vibrations transmitted through solid materials
  - Facilitates walls and ceilings with STC 50, NRC 95

“Moisture poses the biggest threat to structural integrity and durability, accounting for up to 89% of damage in building envelopes”

M.T. Bomberg and W.C. Brown, Construction Canada, 35(1), 1993

“Air infiltration can account for 30% or more of a home’s heating and cooling costs.”

U.S. Department of Energy

Homeowner Energy Cost Allocations

- Space Heating and Cooling 43%
- Refrigeration 8%
- Appliances 8%
- Electronics 9%
- Lighting 11%
- Water Heating 12%
- Other 8%
SPF: The Right Choice for Commercial Buildings

SPF provides insulation, air and moisture protection for many different commercial building roof and wall configurations. SPF use allows for flexibility of building design, reducing overall maintenance costs, and can extend the lifespan of the building.

Roofs

SPF insulation is ideal for roofs because it can be sprayed onto existing roofing material as a re-cover, or applied onto new substrates. SPF roofs are weather-proof, light-weight, durable, and require less maintenance compared to traditional roofing systems. SPF is very compatible with highly reflective coatings for ‘cool roofs’ with improved thermal performance.

<table>
<thead>
<tr>
<th>Thermal resistance (R/inch)</th>
<th>Built-up Roof w/Rigid Board</th>
<th>Membrane Roof w/Rigid Board</th>
<th>New Roof Closed-Cell SPF</th>
<th>Trad. Roof Retrofit With Closed-Cell SPF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduces wall thickness/framing cost</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Continuous insulation</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>No thermal shorts from fasteners and gaps</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Air Barrier/Air impermeable</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>No drafts. Increases energy savings</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Water vapor retarder</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Provides moisture and mold control</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Waterproofing</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Eliminates bulk water ingress</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Structural Enhancement</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Increased resistance to wind uplift</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Durability</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>No leaks and low maintenance costs</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Replacement</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Low cost replacement of roof</td>
<td>Must be torn-off</td>
<td>Must be torn-off</td>
<td>Can spray additional layers</td>
<td>Can spray additional layers</td>
</tr>
</tbody>
</table>

* With additional membrane

Walls

SPF insulation can be sprayed into the interior cavity of commercial walls, or onto the exterior sheathing. SPF is compatible with many different wall types. SPF insulated buildings have superior thermal performance due to the air barrier properties SPF provides, as well as reduced thermal bridging through the studs. In addition, buildings with SPF will have increased structural strength and reduced mold problems.

<table>
<thead>
<tr>
<th>Thermal resistance (R/inch)</th>
<th>Fiberglass Batts</th>
<th>Extruded Polystyrene (XPS)</th>
<th>Interior Closed-Cell SPF</th>
<th>Exterior Closed-Cell SPF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduces wall thickness/framing cost</td>
<td>3.7</td>
<td>3.8</td>
<td>6.2</td>
<td>6.2</td>
</tr>
<tr>
<td>Air Barrier/Air impermeable</td>
<td>✔</td>
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<tr>
<td>Continuous insulation</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Expands to fit and seals cavity</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>No thermal shorts in roofing</td>
<td>✔</td>
<td>✔</td>
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<td>✔</td>
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<td>✔</td>
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<td>✔</td>
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SPF: The Right Choice for Residential Buildings

SPF seals wall and roof cavities to save the homeowner money on heating and cooling expenses. Not only does it provide thermal protection, it provides moisture and air barriers mitigating dangerous mold and wood rot of the structure.

Walls
In a residential building envelope, SPF offers three barriers in one:
• Thermal insulation
• Air sealing
• Vapor barrier

Complete air sealing reduces energy consumption, lowering utility bills. The vapor barrier blocks moisture penetration that can lead to mold and wall damage.

Attics
• SPF can be applied to the roof deck to create an ‘unvented’ attic
• Air leakage between a home’s interior and its attic is eliminated, providing healthier indoor air
• Attic temperatures of just a few degrees higher than the home’s interior extend the life of HVAC equipment
• Attic humidity controlled to levels below 50% prevents mold

Home Weatherization
Weatherization is the process of modifying a building envelope to reduce energy consumption. Weatherization can significantly reduce heating and cooling costs, improve building durability, and create a healthier indoor environment.

Spray foam and one-component foams are ideal for weatherization because they provide two key elements in one product: insulation and air-sealing. Weatherization typically involves air-sealing seams, cracks and openings to the exterior of the house with spray foam or one-component foam. If necessary, additional spray foam insulation can be applied to attics, ceilings, exterior walls, basement walls, floors, and crawl spaces.

SPF for weatherization in the home

SPF Savings in Use

70% Reduction in Heating/Cooling Expenses
• North Texas buildings average 10-14 cents in heating/cooling costs per air-conditioned sq/ft
• Energy-efficient homes with SPF average only 3 cents per air-conditioned square foot

50% Reduction in HVAC Tonnage Requirements
• With SPF, HVACs can be downsized from 1 ton per 500 sq/ft of living space to 1 ton per 1,000 sq/ft.

Tax Credits
• Energy Star Federal Tax Credit for thermal insulation upgrades (09-10) allows for 30% credit up to $1,500

58% Reduction in Utilities
• Roanoke, VA, 2,240 sq/ft ranch home
• Comparison made to 10 similar homes with traditional insulation
• Basis: propane usage from Aug 2000 to July 2001
• Average energy savings of $475/month
SPF: The Right Choice for Greener Buildings

Meeting Advanced Energy Codes

In commercial buildings, SPF offers high R-values, allowing for designs with thinner framing material and thereby more efficient use of wood or steel. SPF reduces the thermal bridging effect in commercial buildings with steel studs significantly. With SPF, building designs easily meet the increased roof and wall R-values mandated in the current most stringent ASHRAE 90.1 standard.

Energy Certified Homes based on programs like EnergyStar, EFL and Building America are easily achieved when SPF is used in a residential building envelope.

Contributing Towards Green Building Certification

SPF can contribute towards green certification programs e.g. LEED and Green Globes for commercial buildings, and LEED-H and the NAHB National Green Building Standard for residential buildings.

Credits are typically obtained in the following sections:

- Energy and Atmosphere
- Sustainable Sites
- Material and Resource
- Indoor Environmental Quality
- Innovation in Design

In addition, SPF systems with at least 8% renewable content are available – meeting many Federal Procurement Preference Programs.
Huntsman is a global leader in the manufacture of spray polyurethane foam (SPF) materials. We offer superior SPF, and expertise in SPF application, building science, building codes, construction practices and more.

**Product**

*Partner with the industry leader*

- Global leadership in SPF materials
- Reliability and consistency
- National product and contractor network

**Quality**

*Choose the best in class*

- Tested and certified in approved labs
- Superior in-field performance
- Backed by the Huntsman product warranty

**Expertise**

*Decades of PU technology experience*

- Access to a global team of highly qualified SPF professionals
- In-depth knowhow in SPF application techniques
- Understanding of construction, building science and codes

**Dedication**

*Experience our customized approach*

- Responsive and flexible team
- Creative approach to business

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For more information, email us, or browse our website at:

sprayfoam@huntsman.com

www.huntsman.com/insulation

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Editor: Monica N Karamagi