



FOAM BOOK 3

EDUCATION ABOUT SPRAY FOAM

BOOK

INSIDE: a high performance SPF roofing system



**ROOFING
INTELLIGENTLY—
SAVING ENERGY**

At Covestro, we're dedicated to helping you build and sustain your business. We've created this series of educational books to help you learn more about spray foam insulation.

Covestro provides spray foam wall insulation systems, roofing spray foam insulation systems, and a full line of specialty coatings that are used for thermal and moisture protection, roofing, waterproofing, abrasion resistance, and other applications. Covestro sustainable products enhance the total building envelope to provide long lasting, durable, energy efficient and improved occupant comfort.

For more information go to
www.polyurethanes.covestro.com

Spray Polyurethane Foam (SPF) Roofing - A High Performance Roofing System



At left:
the Louisiana Superdome
with SPF roofing

Polyurethane Foam

You are already familiar with it!!

Wherever you need the most effective insulation:



What is SPF?

What is SPRAY polyurethane foam?

Spray polyurethane foam is a cellular material that is formed with the spray application and reaction of two liquids.

This application results in a rigid plastic material that expands approximately 30 times its original volume during the curing process.




What is the SPF ROOFING SYSTEM?

It utilizes the unique properties of closed cell polyurethane foam with the spray application directly onto a roof. The whole roof surface receives a seamless, fully adhered, barrier to water that is over 1 inch thick.

The foam is then protected by a protective coating.

What makes an SPF Roof High-Performance?



● a high-performance roof is one that integrates and optimizes, on a life cycle basis, all major high performance attributes, including:

- ★ waterproofing
- ★ energy conservation
- ★ environment
- ★ safety
- ★ security
- ★ reliability
- ★ cost benefit
- ★ productivity
- ★ sustainability
- ★ low maintenance

...while reducing operational cost



Waterproofing

Polyurethane foams form a more than 1-inch thick, monolithic, self flashing surface which effectively seals against leaks

- Seamless construction
 - ★ No weak spots, such as fasteners or seams, to develop leaks
- Self flashing
 - ★ Roofs with multiple penetrations can be sealed with ease
- The foam can be sprayed with slope to drains, facilitating water removal
 - ★ Even severely ponded roofs can be made to drain completely
- Fully adhered membrane
 - ★ Even if damaged, water can not travel under a foam roof

Energy Conservation

The use of SPF in roofing applications provides significant energy efficiency benefits because it:

- ⚡ provides the highest R Value insulation
- ⚡ eliminates thermal shorts (No fasteners)
- ⚡ controls air movement (No gaps)
- ⚡ controls moisture transport within the system

An additional energy benefit — cool roof coatings



Typical Roof

90°
Outside
Air Temperature

Heat

Black Roof
Membrane

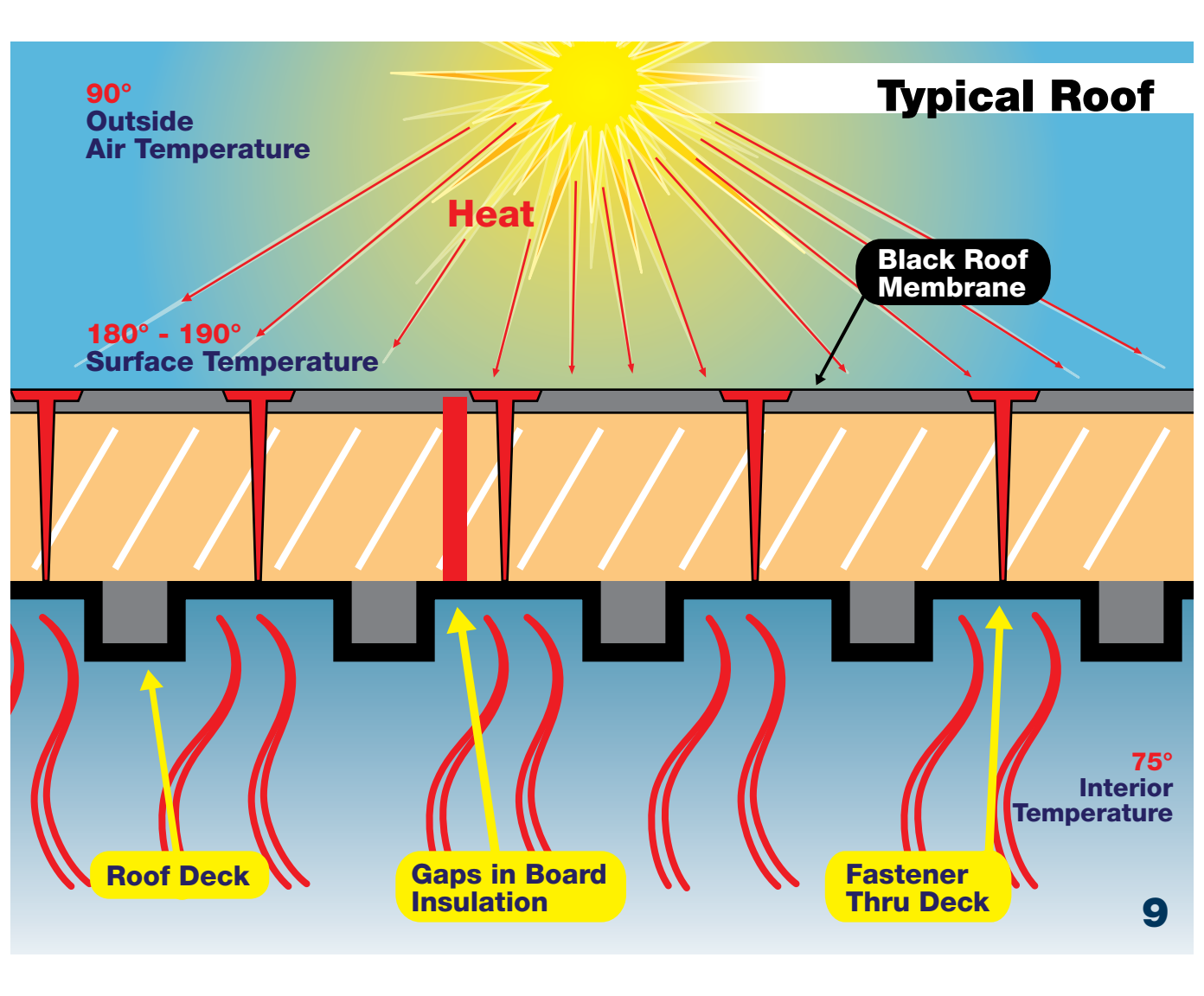
180° - 190°
Surface Temperature

75°
Interior
Temperature

Roof Deck

Gaps in Board
Insulation

Fastener
Thru Deck



90°
Outside
Air Temperature

SPF Roof

Heat

**Cool Roof
Coating**

110° - 130°
Surface Temperature

SPF (1" - 2" Typical)

75°
Interior
Temperature

Roof Deck

**Gaps in
Board**

**Fastener
Thru Deck**

Environmental Benefits

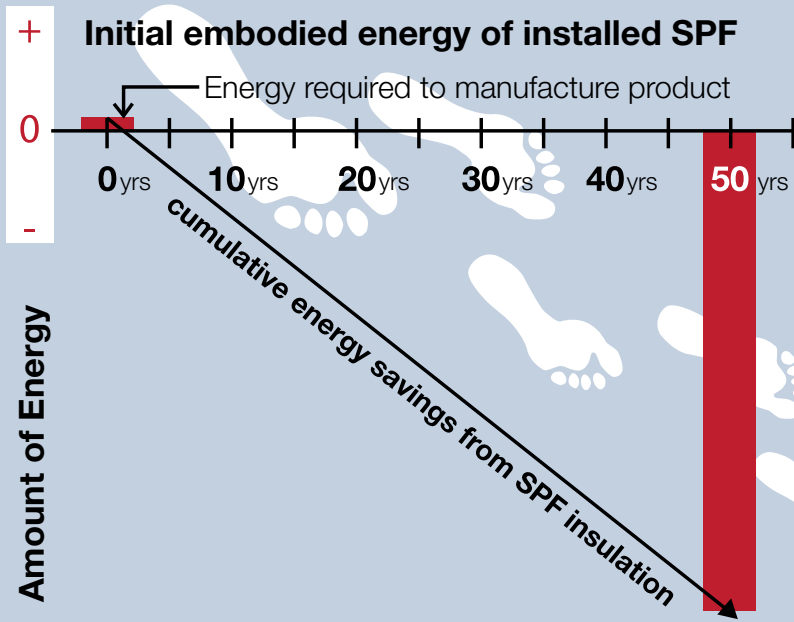
SPF can be applied to an existing roof (after the removal of gravel and dirt) eliminating costly tear-offs and resulting land fill disposals



- ★ Superior Reflectivity & Emissivity - Mitigates Heat Islands
- ★ No Hazardous Kettles
- ★ SPF roofs are a truly sustainable solution
- ★ Energy savings...

Environment

Relative energy used to manufacture and install the SPF insulation (including the blowing agent) compared to the huge amount of energy saved as a result of its insulative properties.



Since CO₂ is currently released in the generation of electricity in the U.S., a correlation can be certainly drawn between energy reduction and CO₂ reduction, or carbon footprint.

When U.S. Energy Secretary Steven Chu, a Nobel laureate in physics, recently called for painting flat roofs on commercial buildings white to combat global climate change, it seemed deceptively simple: achieving sweeping energy savings with simply a coat of paint. Chu was referring to elastomeric roof coatings which are more than a paint they are a specialty cool roof technology designed for long term durability and reflectivity. In harsh roofing environments this energy saving technology reflects reflect the sun from a roof while preventing energy dollars from leaking out. It's technology that's already commercially available and viable for widespread use.

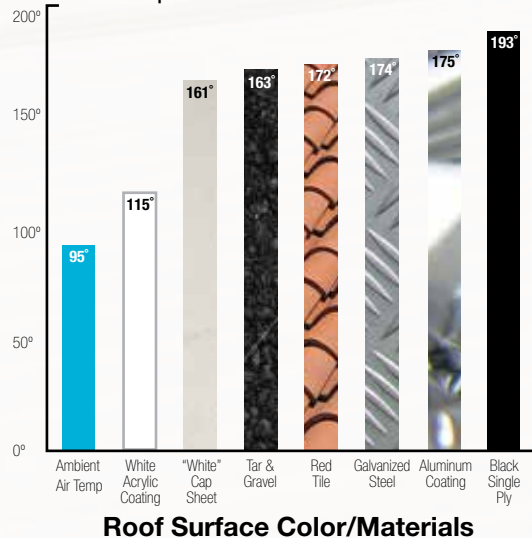




What makes a Cool Roof so hot?

A Cool Roof reflects, rather than absorbs, the sun's energy from the roof surface and emits the sun's heat back to the sky. A building with a Cool Roof alone can generate savings of 10 to 20 percent of its electricity bill due to its reflective properties. Cool Roof technologies from Covestro LLC, using Bay-block™ for example, can reduce roof temperature up to 98 degrees Fahrenheit. By reducing the heat transferred into the building, Cool Roofs help lower energy costs and improve indoor comfort. In contrast, a common, dark colored roofs can reach temperatures up to 190 degrees Fahrenheit.

Surface Temperature



Safety & Security

Severe Weather & Wind

Key Findings

- SPF roofs' wind resistance actually exceeds the capability of the wind tunnels designed to simulate hurricane wind roof blow-off conditions
- UL also observed that SPF re-roofs applied over traditional roof systems increased the wind uplift resistance of those roof coverings
- Factory Mutual Global roof wind testing showed similar results over concrete, metal, and wood decks
- SPF also offers increased resistance to hail, flying debris or "missiles" during high wind events
- Gouged spray foam roofs can continue to perform well without repairs for months without leaking both during and after severe storms
- SPF roof systems have a proven track record for protecting buildings against severe storms, tornadoes, and hurricanes.

Source

**Underwriters
Laboratory**

Factory Mutual

**Roofing Industry
Educational
Institute**



Operational Considerations

During Installation:
With no removal of existing roof, disruption is minimal.

Potential for water damage inside the building during installation is eliminated.

Life of Building
HVAC usage will be cut dramatically.

Equipment will last significantly longer
Replacement equipment can be sized smaller



Cost Benefits

Up-front Installed Cost

Competitive, if not lower cost in most applications

\$ Lowest life-cycle cost

\$ Superior insulation reduces energy consumption

Energy Savings will pay for installation cost

\$ Light weight, approx. less than 1 pound per square foot

Saves cost and disruption of removal of old roof

\$ Sustainable/renewable warranty



RELIABILITY

In 1996 and 2003, the National Roofing Foundation commissioned Dr. Rene Dupuis of Structural Research Inc. to conduct an extensive study¹ of SPF roofing systems. The study included over 300 SPF roofs in six different climate zones around the United States. A conclusion from this completely independent study was that SPF roofs have an effective service life of more than 30 years.

Sustainability

Michelsen Technologies Report: Lifecycle analysis for SPF roof systems¹

System life cycle costs between 10 and 50 percent less than standard built-up-roof, modified-bitumen and single-ply membrane roof systems over a 30-year time frame.

The report attributed these savings to:

- Low cost to remove and dispose of existing roof materials
- Energy savings from superior thermal performance and highly reflective SPF roof surfacings
- No damage to be repaired caused by leaking or moisture
- Minimal comparative maintenance and recoating costs

¹Honeywell white paper "Insulation Energy Savings: Key Issues and Performance Factors"

Productivity

Spray foam roofing can be applied quickly over a wide variety of substrates and most existing roof surfaces. Since it is self adhesive it bonds quickly and securely to the substrate to which it is being applied.

No other system comes close
on multiple penetration roofs



Lightweight

Conforms to Unique Shapes

Variety of Surface Finishes

what goes on top? **Coatings**

Several types of coatings are available to protect polyurethane foam from ultra-violet light from the sun.

The primary coatings utilized are:

Acrylics

Durable, low VOC water-based coatings with superior solar reflectance

Silicones

Extremely UV resistant and can be applied in low temperatures



The Covestro SPF Roofing System Offers:

- Unmatched range of benefits
- Quality **Products**
- Approved **Contractors**
- Proven Systems & **Designs**
- **A brand you can depend on**



Covestro - Quality Contractor Program

Only the most accomplished
contractors have been chosen
by Covestro for their Quality
Contractor (QC) program.

Only QCs are licensed and
allowed to install a Covestro
warranted SPF Roofing System

**Every Covestro
installation is**
inspected by an independent third party
engineering firm & the roof is then rated.

Each year the QCs are evaluated
& only those contractors with
excellent ratings remain in the program



Summary - SPF Advantages

SPF roofs are Energy Star®
Roofing System qualified



SPF roofs are sustainable & renewable



SPF roofs can offer Cool Roof benefits



SPF roofs offer the lowest life cycle cost



SPF roofs are an environmentally
responsible roofing system



SPF roofs rarely require tear
off of the existing roof



SPF roofs typically pay for the installation
costs with energy savings



SPF roofs offer unmatched wind resistance





**Go to www.polyurethanes.covestro.com
to learn more about the competitive advantages
of spray polyurethane foam.**

**DOWNLOAD:
Product Datasheets
Specifications
Project Profiles
Safety Data Sheets**

2400 Spring Stuebner Rd.
Spring, TX 77389
1 800 221-3626
Tel 281 350 9000
Fax 281 288 6450
Email spfcustomerservice@covestro.com

www.polyurethanes.covestro.com



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