Working Smart with Low Pressure Spray Polyurethane Foam

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BPI Certified Building Analyst
Fomo Products, Inc.

- Manufacturer of low pressure polyurethane foam since 1975
- Located in Akron, Ohio
- Brands include:
  - Handi-Foam®
  - Handi-Flow®
  - Handi-Seal®
  - Handi-Stick®
  - Silent-Seal®
Agenda

Foam 101 – polyurethane foam basics
Work Smart – product stewardship
Weatherization – case study
Foam 101

Polyurethane Foam Basics
Polyurethane Foam Overview

• What is Polyurethane Foam?
  – Polyurethane Foam is made through a chemical reaction when a polyol blend and isocyanate combine.

• What are the different kinds of Polyurethane Foam?
  – One Component Foam (OCF)
  – Spray Polyurethane Foam (SPF)
  – Pour-in-Place Polyurethane Foam (PIP)
Polyurethane Foam Overview

- Open Cell vs. Closed Cell

<table>
<thead>
<tr>
<th>Closed-Cell</th>
<th>Open-Cell</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highest insulating &quot;R-Value&quot; per inch (&gt; 6.0)</td>
<td>Good insulation value (R = 3.5)</td>
</tr>
<tr>
<td>Low vapor permeability (low perm)</td>
<td>Higher vapor permeability, but controlled</td>
</tr>
<tr>
<td>Air barrier</td>
<td>Air barrier at full wall thickness</td>
</tr>
<tr>
<td>Increases wall strength</td>
<td></td>
</tr>
<tr>
<td>Resists water (is a WRB – &quot;Water Resitive Barrier&quot;)</td>
<td></td>
</tr>
<tr>
<td>Medium density (1.75 – 2.25 lbs./ft3)</td>
<td>Low density (0.4 – 1.2 lbs./ft3)</td>
</tr>
<tr>
<td>Absorbs sound, especially bass tones</td>
<td>Best sound absorption in normal noise frequency ranges</td>
</tr>
<tr>
<td></td>
<td>Economical yield</td>
</tr>
</tbody>
</table>
Polyurethane Foam Overview

spraypolyurethane.org

• Low pressure vs High Pressure
  – Low pressure = <250 psi
  – High pressure is dispensed at 1000+ psi or higher and molecules are sent into the air
  – All Handi-brand products from cans to 100 gallon refillable containers are low pressure
  – Re-entry 1 hour vs 24 hours
Polyurethane Foam Overview
spraypolyurethane.org

Low pressure
• one component cans, spray polyurethane foam kits and refillable tanks.
• insulate and seal small to mid-size areas such as rim joists, attics or HVAC systems.
• used by weatherization professionals and spray polyurethane foam contractors.
• Proper personal protective equipment or PPE is required including eye, skin and respiratory protection.

High pressure
• Two-component, high pressure systems use 55-gallon drums, spray rig, supplied air and hoses and are more often used when insulating larger areas on new construction or major renovations on walls and roofs.
• Installers should wear proper protective equipment to spray the foam which can be dispensed at pressures up to 1600 psi. This high pressure foam requires additional safety equipment such as supplied air respirators.
One Component Foam

• Let’s take a closer look
  – One Component Foam (OCF)
    • Moisture cured sealant or adhesive
    • Comes in a can or a cylinder
    • Can be dispensed with a straw, a professional dispensing unit or a brass wand applicator
    • Used for bead applications to seal gaps the size of your finger- less than 3”
    • Dispensed the size of your pinkie, expands to the size of your thumb
Spray Polyurethane Foam

• Let’s take a closer look
  – Spray Polyurethane Foam (SPF)
    • Chemically cured
    • Comes in disposable or refillable cylinders
      – A side – isocyanate and blowing agent
      – B side – polyols, catalysts, blowing agent, flame retardant, surfactant.
    • SPF insulates and air seals cracks, seams, and joints.
Pour-in-Place Polyurethane Foam

• Let’s take a closer look
  – Pour-in-Place (PIP)
    • Chemically cured - Slower
    • Comes in disposable or refillable cylinders
      – A side – isocyanate and blowing agent
      – B side – polyols, catalysts, blowing agent, flame retardant, and surfactant.
    • PIP fills and insulates large voids and cavities
What is R-value?

• R-value
  – R stands for Resistance to heat

• Used to rate an insulation’s ability to resist conductive heat transfer

• Higher = greater insulating power, more effective at reducing heat flow
Stopping Air Infiltration with Low Pressure Polyurethane Foam

- High R Value
- Stops air infiltration
  - Fiberglass does not
- Moisture barrier
- Reduces noise
- Convenient for small retrofit jobs and easy to apply
Choosing the Right Foam

• **OCF**
  - Bead applications
    • Window (ex. Handi-Seal)
    • Sill plate (ex. Handi-Foam)
    • Wire and plumbing penetrations (ex. Fireblock)
  - Adhesive
    • General Use
    • Subfloor or Polystyrene Construction Adhesive

• **SPF**
  - Larger area or cavity larger than your fist or for surface coverage
    • Rim joist
    • Attic floor
    • Top plates
    • Crawlspace

• **PIP**
  - Large cavity or void
    • Block or mold filling
    • Boat flotation
Low Pressure Polyurethane Foam
Health & Safety
Government Involvement

• Growing governmental interest in the polyurethane spray foam industry
• EPA and other government agencies intend on showing the public that it’s seeking to protect workers & consumers from chemical hazards
• Specific concerns deal with dangers of diisocyanates & proper personal protective equipment or PPE required
Government Involvement

• Educated the governmental committees on the differences and lowered risks associated with low pressure foam vs. high pressure spray foam that their information was primarily focused on

• Fomo is involved in the governmental activities, dedicated to continuous communication—focusing on safe & healthy use of our products
• Goal: Create a two year communication program to educate stakeholders regarding:
  – **safe and proper use** of our low-pressure products
  – **application information** for distributors, sales reps and contractors.
  – reinforcing Handi-brands
Industry Packaging Updates
Packaging Updates

FOR PROFESSIONAL USE ONLY
Included in all low pressure SPF kits
Safe Use and Handling

• Handi-Brand products are for professional use only. Homeowners and children should never use these products.

• Both one and two component foams should be used in well ventilated areas with proper PPE.
# Health & Safety

<table>
<thead>
<tr>
<th>Routes of Exposure</th>
<th>One-Component Foam (OCF)</th>
<th>Two-Component Spray Polyurethane Foam (SPF) and Pour-in-Place (PIP) Foam Kits</th>
<th>Two-Component Spray Polyurethane Foam (SPF) and Pour-in-Place (PIP) Foam Refillable Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>EYES</td>
<td>Safety Glasses</td>
<td>Safety Glasses or Goggles</td>
<td>Safety Glasses or Goggles</td>
</tr>
<tr>
<td>SKIN</td>
<td>Covers Skin</td>
<td>Covers Skin</td>
<td>Covers Skin</td>
</tr>
<tr>
<td>HANDS</td>
<td>Nitrile Gloves</td>
<td>Nitrile Gloves</td>
<td>Nitrile Gloves</td>
</tr>
<tr>
<td>LUNGS</td>
<td>Avoid Breathing Vapors. Provide Good Ventilation.</td>
<td>Respiration and/or Vapor Respirator O/W Pre-filter Provide Good Ventilation.</td>
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Storage, Disposal and Handling

• Storage
  – Keep out of reach of children
  – Store in a room temperature, dry area
  – After initial use, close valves and store at room temperature

• Product Disposal
  – Do not incinerate tanks
  – See Product Stewardship Guidelines

• Documentation
  – MSDS, TDS, Operating Instructions on fomo.com
The right products for the right applications

Weatherization Case Study
Weatherization Case Study

- Air Leakage Principles
- Why Weatherize with SPF & OCF (Spray Polyurethane Foam)?
- Case Study – Weatherization Retrofit
- Dramatic Air Leakage Improvement
- The Savings
Why Weatherize with Polyurethane Foam?

Positive Air Pressure Exfiltrates from the Attic

Neutral Pressure Plane

Positive pressure

Negative pressure

Negative Air Pressure Infiltrates from Below

Stack Effect
Weatherization Retrofit

- Traditional Vented Attic
- R 38 Blown Fiberglass
Blower Door Test #1

- 9.3 ACH$_{50}$ (Air Exchanges per Hour)
- 5.4 MVR (Min Ventilation Req)

Nearly 2 Times Recommended Air Exchanges
Fiberglass Removal

- Expose Thermal Bypasses

Remove All Existing Insulation
Blower Door Test #2

- 9.5 ACH<sub>50</sub>
- No Insulation (Attic or Rim Joist)
- Only 2.5% Increase

Insignificant Difference
Expose Thermal Bypasses

- Pipe Penetrations
- Drywall to Wood
- Junction Boxes
- Can Lights
- Top Plate
1” Handi-Foam

Nominal 1” Closed Cell Foam
Blower Door Test – Post Foam

Significant Difference with Foam

- 7 ACH\textsubscript{50}
- 25% Reduction!
Air Seal Rim Joist

Most Notorious Air Infiltration Area
Add R-49 Cellulose

Air Seal Helps Traditional Insulation Perform
Final Blower Door Test

- 6.3 ACH\textsubscript{50}
- 32% Reduction!

Dramatic Air Leakage Improvement
Major Difference year over year
Over $200 Savings!

Jan pre-air seal: $273.22
Jan post-seal: $70.99
Savings: $202.23

Over $200 Savings!
Questions?

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