

QUALITY CONTROL WITH SPRAY FOAM INSULATIONS:

Safety Compliance, Industry Myths and
Contractor Selection

Today's Presenters

- Brian Oman, Marketing Applications Specialist, LEED BD & C
 - Residential / Light Commercial Spray Foam Insulations

Who is BASF?

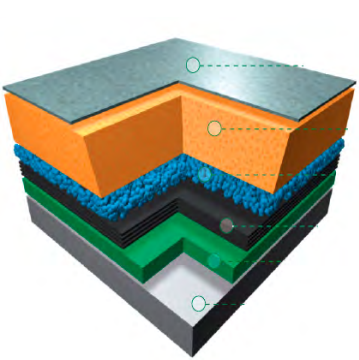
- BASF is the largest Construction Chemical Company in the world. BASF is also:
 - The market leader for spray polyurethane foam in the United States and in the world.
 - An ISO 9002 certified manufacturer. This quality assurance program and certification ensures that the processes that develop the product are documented and executed in a quality manner.
 - With the Center for Building Excellence, BASF now provides core expertise in residential and commercial Building Science, with disciplines in architecture, building planning, energy modeling, building forensics, and plan analysis.

Learning Objectives

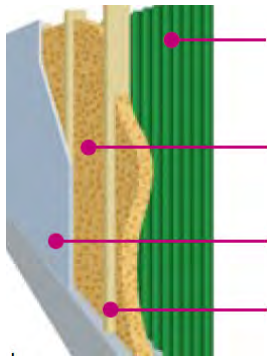
After completing today's course, you will be able to:

- Explain the various types of spray polyurethane foams (SPF) used in residential construction. Identify the different physical / performance properties of open- and closed-cell SPF materials.
- Describe the industry myths about each type of SPF insulation, and explain the misnomers.
- Explain the importance of proper handling and safe use of SPF materials, understanding the implications of OSHA's National Emphasis Program (NEP) on isocyanates
- Determine how to select a Qualified SPF Contractor & prevent misapplication
- Distinguish the features and benefits of using spray polyurethane foam for residential construction, and identify the various areas of the residential building envelope where SPF is best used.

SPF Application Markets Today



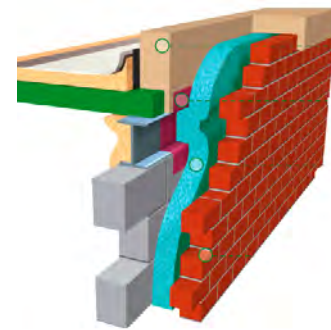
Low-slope
Roofing



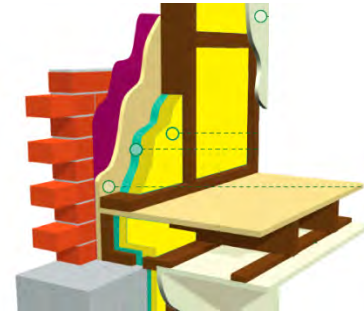
Comm-
Industrial-Ag



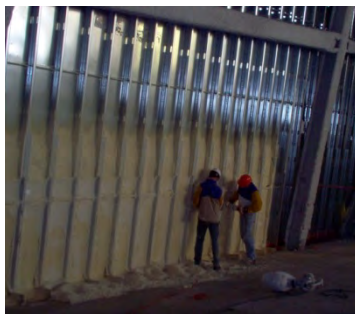
Retrofit
Residential



Commercial Air
Barrier



Residential



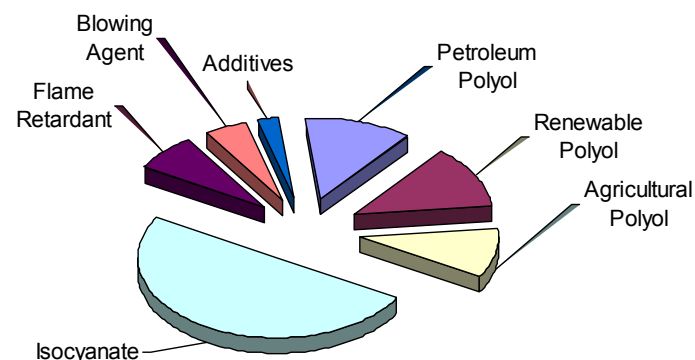
What is Spray Polyurethane Foam?

- SPF Insulation is created by the reaction of two liquids
 - 2 component, 1:1 ratio mixture to create finished foam insulation on the jobsite
 - Not a DIY product – takes trained, qualified applicators to properly install
 - Product quality and finished material is highly dependant on ability of applicator to follow manufacturer and industry guidelines
 - 35+ year performance history in commercial construction
 - 25+ year performance history in residential construction
 - Can be used safely when wearing proper protection equipment



SPF Chemistry and “Green” Content

- SPF chemistry is nearly ALL the same:
 - Component A- Isocyanate: MDI-PMDI (Adhesive/Hardener)
 - Component B- Polyol resin: Polyols, catalysts, blowing agents, flame retardants, smoke suppressants & surfactants
- “Green” or sustainable components make up only a portion of the polyols in the B drum – all other components remain fairly equal
 - Post-scrap plastics reprocessed (recycled soda & water bottles)
 - Renewable or plant-grown materials (sugar beets, soy, cane products)
- Based upon the total percentage of all polyols that have the capacity of being recycled or renewable in content, spray foams contain no more than 15-20% of these materials total



Spray Foam Equipment & SPF Reaction

- Both liquids stay apart until they meet at the tip of the spray nozzle
- “Exothermic” chemical reaction when the two components meet
 - Added heat and pressure creates more heat



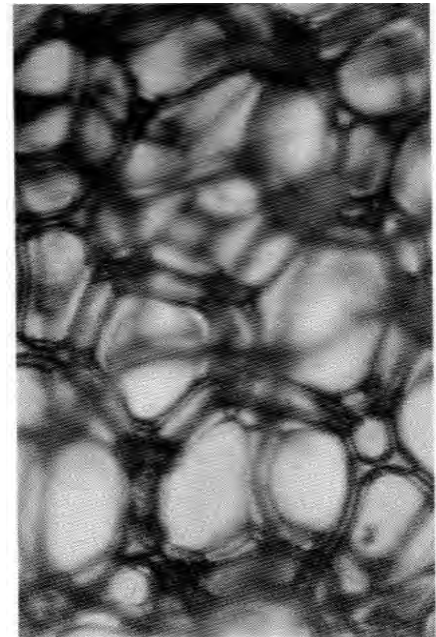
Spray Foam Rig

- Most often a trailer or truck
- Can be self contained with onboard generator
- May use shore power from jobsite
- Crucial that foam rigs are in working order and maintained



Foam Chemistry Basics

- It's the Blowing Agent (BA)...
 - Open-cell, low-density foams
 - No chemical gas blowing agent
 - Use water which heats up and reacts with Iso or "A" to create steam and CO₂
 - In closed-cell foams, the BA gives most of the valuable properties that come with the premium price for ccSPF
 - Blowing agent is a gas called 245fa, supplied by Honeywell
 - EPA Approved, Non-Ozone Depleting material
 - 245fa is twice as efficient as a thermal insulator as air
 - Closed-cell foams have a microscopic cell structure created in this fashion, filled with blowing agent
 - Over One Million closed cells per cubic inch



What You Need To Know about SPF

• **Open-Cell Spray Foam**

- “½-lb” density
 - Semi-rigid spray foam
 - Low density
- Fills up the wall cavity
 - High expansion
 - Shaving required
- Water blowing agent
 - Expands & leaves open air pockets
- R-value = 3.5-4.0/inch
- No structural value

• **Closed-cell Spray Foam**

- “2-lb.” density
 - Rigid SPF
 - High/medium density
- Not full wall thickness
 - Controlled expansion
 - Hybrid system applications
- Non-ozone depleting (HFC) blowing agent
 - Millions of tiny closed-cells trap this high-efficiency gas
- R-value = 6.0-7.0 per inch
- Offers up to 300% increased structural value (over 2”)

What You Need To Know about SPF

• Open-Cell Foam

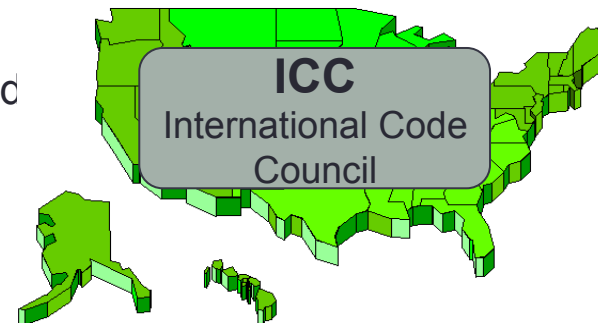
- Air Barrier at 3.5"
 - Meets sealant requirement of IECC
- Additional vapor retarder over open cell foam typically required in cold climates
 - 5" application = 10 perms
- Water can absorb (up to 40% by volume)
 - Do not use below grade or on ductwork
- Offers sound absorption and barrier performance

• Closed-cell Foam

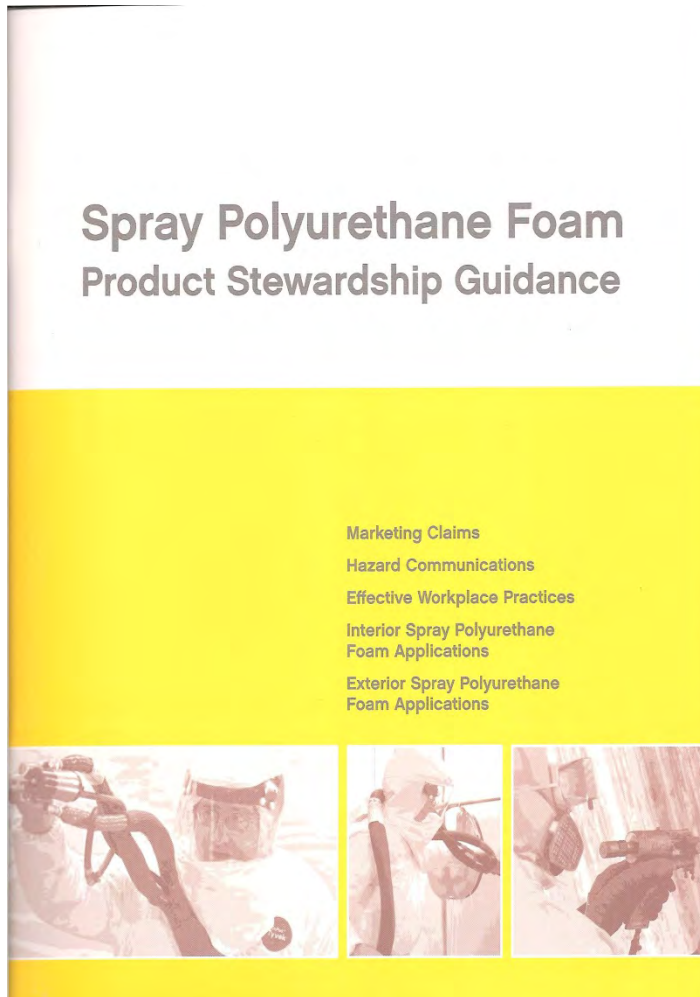
- Air Barrier at 1"
 - Meets sealant requirement of IECC
- Code defined class II vapor retarder at 1"-2.5" or greater
 - Typically 1.5"-2" application = Less than 1 perm
- Difficult for water to absorb (less than 4% water absorption) - Hydrophobic
 - FEMA Flood Resistant
- Offers sound barrier performance only (will not absorb noise)

SPF and the International Codes

- Code Sections relevant to SPF in the “I-codes” or baseline codes of each State code
 - International Residential Code (Most states using 2006 or 2009 IRC)
 - Section R314/6 Foam Plastic in Building Planning (Chapter 3), R320 Protection Against Subterranean Termites, R806.4 Unvented Attics (from 2009)
 - International Building Code (Most states using 2006 or 2009 IRC)
 - Chapter 26 Section 2603 Foam Plastic Insulation
- Code Focus
 - Fire Protection – 15-minute thermal barriers required and ignition barriers / alt. assemblies allowed in limited access areas such as non-storage attics and crawlspaces
 - Thermal Performance – Must claim and use Aged R-values at installed thickness – not linear
 - Moisture Control – Vapor control layers must be considered
 - Fire performance of commercial assemblies
 - Hourly rated walls or ceiling / floor configurations
 - NFPA 285 for exterior walls containing SPF



Safety with Spray Polyurethane Foam



- New Government Oversight Committees and National Emphasis Program from OSHA on Isocyanates
- Support from American Chemistry Council's Center for the Polyurethanes Industry (CPI)
- Full details for safe handling of Spray Foam, including Respiratory Protection and other Personal Protection Equipment (PPE) found at:

www.spraypolyurethane.org
- Contractor training and certification available at above site – All companies should use this!

American Chemistry Council SPF

www.spraypolyurethane.org

- Many different helpful tools on it for SPF health and safety for everyone involved.
- On the right hand side of the page you will see the Health & Safety Training
 - When contractors complete the program, they receive a certificate of completion and a wallet card to carry.
 - Ask for their ID # and you can look up on this site to validate their training.

Spray Polyurethane Foam HEALTH and SAFETY

Search... Go

Home | Professional Contractors | Weatherization Contractors | Do-It-Yourself | Homeowners | News Room

Whether you're a [homeowner](#) hiring someone to install spray polyurethane foam (SPF) for you, a [do-it-yourselfer](#), an SPF [contractor](#), [builder](#) or [weatherization professional](#), this site will give you the facts about SPF and important safety guidelines that should be followed during application.

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Health and Safety Training

CPI SPF Chemical Health and Safety Training

[» CLICK HERE TO REGISTER!](#)

[» Guide to Become an In-Person Instructor](#)

[» Check Applicator Status](#)

[» Instructional Video](#)

Resources

[Health and Safety Product Stewardship Workbook for High-Pressure Application of SPF and Presentation](#)

[Guidance for Videos or Images Showing SPF Application](#)

[Handling and Disposing Drums Containing Spray Polyurethane Foam \(SPF\)](#)

[» more](#)

I'm an SPF contractor/building and construction **PROFESSIONAL**

[Learn more](#)

I'm a **WEATHERIZATION** contractor/professional

[Learn more](#)

I'm a **DO-IT-YOURSELFER** installing SPF

[Learn more](#)

I'm a **HOMEOWNER** having SPF professionally installed

[Learn more](#)

Safety with SPF Applications

- New standards from EPA, OSHA, NIOSH.....
 - BASF was a leader on the joint committees and will continue to support efforts
- OSHA National Emphasis Program
 - Much more active on SPF jobs – Areas of concern:
 - Keep two copies of MSDS on truck at all times, in cab and box
 - Not just for foam but all chemicals
 - Employees must know how to read and tell inspector about MSDS, fall protection, mask maintenance, eye wash stations, fit testing & respirator training, etc.
 - Written Hazard Communication Program
 - Medical Surveillance Program
 - Yearly testing
 - Model Respirator Program
 - Respirator Fit Testing

Application Safety – Importance of Protection

- Why is it important to protect yourself from the MDI component (A / Iso) when around the application of SPF insulation?
 - Contact with excessive amounts can be harmful to your health
 - Overexposure due to material that is sprayed and/or heated comes from the following:
 - Breathing airborne concentrations
 - Getting MDI on your skins
 - Getting MDI in your eyes
 - Continued overexposure lead to sensitization
 - Once sensitized, very limited exposure will create health effects
- Other components such as catalyst, polyols and blowing agent also have potential health effects

Safety with SPF Applications

- REQUIRED Personal Protection Equipment (PPE)
 - Respiratory Protection
 - Full Face Supplied Air Respirator for both applicator and helper during application
 - Clean up crews after installation - cartridge mask can be utilize with approval by your respiratory program administrator (subject to change)
 - Body Protection NO SKIN SHOWING!!
 - Chemical Resistant Suit (HOT!!!)
 - Chemical Resistant Boots/Booties
 - Nitrile Gloves to protect hands from absorbing chemicals
 - Head masks
 - Eyewear with side shields
 - To protect from chemical splashes and absorption of mists into eyes

Other Safety Considerations

- Safety Gear for Insulation Jobsites (in addition to SPF PPE)
 - Fall Arrest (if applicable) Lines, Tapes, Spotter, Rails Systems and/or combination
 - Fire Extinguisher Near spray unit and spray area
 - Spill Kit To absorb spills and neutralize per MSDS
 - First Aid Kit Eye wash and minor injuries
 - Wind Screens For external work or large open areas, to prevent overspray

Applications – Health & Safety Warning Sign

WARNING

**Breathing Hazard During
The Application of Insulation
Materials**

DO NOT ENTER

Without Proper Respiratory Protection

NO SMOKING

Applications – Safety on the Jobsite

- TDS and MSDS must be on the job site / readily accessible in truck
- Quality controls start at the estimation & bidding processes
- After SPF is sprayed on jobsite:
 - Protect foam from accidental ignition by other trades
 - NO HOT WORK Signs should be posted

Applications – Fire Safety

****CAUTION****

NO HOT WORK!

No open flames, torches or other hot surfaces should come in contact with Spray Foam surface. Protect with fire resistant material!

Other OSHA Programs which may be reviewed on jobsites...

- Other OSHA Programs may be enforced, including:
 - Spill Prevention Program
 - Lock, Tag and Try
 - Hot Work Permit
 - Fall Protection
- There may be other programs needed that could be examined on a jobsite while the foam operation is being investigated.

How do I get additional information?

- The CPI document library provides a multitude of guidance documents and videos accessible via the following link:
<http://polyurethane.americanchemistry.com/Resources-and-Documents-Library#EHS>
- The complete text of OSHA's NEP on isocyanates is available at:
http://www.osha.gov/OshDoc/Directive_pdf/CPL_03-00-017.pdf
- In addition, OSHA's webpage on isocyanates has info available at: <http://www.osha.gov/SLTC/isocyanates/index.html>
- Wipe testing or SWYPE test kits can be purchased from CLI Laboratories at:
<http://www.clilabs.com/products/surface-swypes.html>
- Material Safety Data Sheets can be obtained from the local manufacturer's sales or technical representatives.

Example of SPF Jobsite Safety Plan

8.1) Jobsite Safety Plan

You may have different components to your plan due to your jobsite.



	Verification that all personnel read and understand the MSDS for each material involved with the spray polyurethane foam application process.
	A copy of the most current MSDS should be available at all times (i.e. cab of the truck or in the trailer that is transporting the spray equipment).
	Communication procedures between the crew and customer.
	Overspray mitigation plan.
	Proper start-up and shut-down procedures for both SPF process equipment and the customer's equipment (i.e. HVAC system) when applicable.
	Review of Manufacturers Technical Data sheets that detail proper application procedures.
	Onsite review of the jobsite; note any potential safety hazards and special needs.
	Controlling access to the spray area.
	Proper set up for all equipment with particular emphasis on ladders or scaffolding which could present fall hazards.
	Proper set up for establishing the work area and restricting access by posting warning signs.
	Emergency procedures with notification procedures.
	Chemical spillage with current remediation procedures and notification procedures.
	Jobsite location and directions to the jobsite from the nearest major intersection.

Example of SPF Equipment Checklist

8.2) Equipment Inspection (Safety) Checklist

Each jobsite may have unique needs to consider and include in its Jobsite Safety Plan.

✓ Air and chemical leaks

<input type="checkbox"/>	Inspect air and chemical lines for signs of wear or fatigue.
<input type="checkbox"/>	Ensure the compressed air system has the proper OSHA-compliant disconnects.

✓ Proper ventilation of engine exhausts

<input type="checkbox"/>	Verify adequate ventilation. The buildup of carbon monoxide from engine exhausts can be deadly.
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✓ Ladders, scaffolding, and aerial lifts

<input type="checkbox"/>	Improper use of ladders, scaffolding, and aerial lifts can be a source of jobsite injuries or deaths. Proper use of ladders, scaffolding and aerial lifts is a major point of emphasis in the overall jobsite safety plan.
<input type="checkbox"/>	Consult the OSHA website along with the manufacturers care and use specifications for this equipment.

✓ Hoses, electrical cords and lights

<input type="checkbox"/>	Use properly rated electrical cords and lights.
<input type="checkbox"/>	Remove from service cords that are damaged, frayed or spliced.
<input type="checkbox"/>	Properly ground/bond plugs and receptacles, including ground wire.

✓ Ventilation fans and ducts

<input type="checkbox"/>	Clean fans and check if fully operational.
<input type="checkbox"/>	Clean ducts and seal to eliminate leakage.

✓ Chemical storage and handling

<input type="checkbox"/>	Proper environmental controls to ensure proper storage conditions.
<input type="checkbox"/>	Proper restraining devices to secure chemicals during transportation.
<input type="checkbox"/>	Spill control equipment.
<input type="checkbox"/>	Decontamination solution.

✓ Emergency equipment

<input type="checkbox"/>	A fully stocked and OSHA-compliant first aid kit.
<input type="checkbox"/>	Eye wash station.

✓ Fire Prevention

<input type="checkbox"/>	Fire extinguisher(s) fully charged and accessible.
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✓ Other

<input type="checkbox"/>	Tools, spare parts, and equipment manuals.
<input type="checkbox"/>	Jobsite Safety Plan.

- Courtesy of Spray Foam Coalition
– CPI / ACC

Applications – Job Prep

- SPF Contractor should discuss potential concerns with Builders
 - Either manage yourself or bring to attention in advance of the project
 - Areas should be clear for access to working near walls/roof
 - No other trades in immediate work area – possibly entire home (depending on conditions, ventilations, etc.)
 - Ensure all wiring, plumbing, vent pipes or any other through-wall penetrations are in place prior to foaming
 - Ensure all air intake is shut down / masked
 - Separate areas to be sprayed from other areas in operation
 - Heating houses in winter
 - Preheat, then shut down
 - No open flames!! Use ducted or radiant heaters only

Applications – Jobsite Preparation

- Shut down HVAC systems during application of primers, spray polyurethane foam, and coatings to stop the drawing of dusts, aerosols and/or vapors into adjacent spaces
 - Seal the air intakes with plastic sheeting and tape, which will prevent dust and spray from entering the intakes.
 - Keep the plastic sheeting in place at least several hours after the spray application is completed.
 - System should not be restarted until appropriate time has elapsed and the plastic sheeting and tape is removed.
- Containment and ventilation methods may help prevent migration of SPF to other areas.
- If local exhaust ventilation and containment methods are not used, establish a work zone around the work area to protect adjacent workers.
 - Distance is typically 25 feet, but depends on several factors, including but not limited to volume of SPF applied, area covered, and air movement.
 - Signage should be used to communicate access restrictions. Limit access to persons wearing proper personal protective equipment or trying to schedule other trade workers at times when SPF application is not underway.
- Before beginning work, a designated area should be established for putting on and removing PPE.
- Determine in advance the potential for overspray damages. Have a plan in place to address overspray damages to adjacent property. All employees should be trained in overspray prevention.
- Identify and protect surfaces that could be damaged (e.g., windows, doors, equipment, or building exterior) in advance of application and ensure proper masking is conducted.

Applications – Job Prep

- Masking of all non-foam surfaces that would be subject to overspray
 - Windows / Doors / Bathtub/shower surrounds / Garage doors / Masonry/Fireplaces
 - Cover outlet boxes to ensure SPF stays out
 - Check all air intakes to ensure furnace is not running and drawing fumes / particulate

Applications – Substrates / Primers

- Must be a clean, dry, sound surface to spray
 - Suitable to Wood, Concrete, and Metal surfaces - Consult manufacturer for any questionable applications
 - Surface must be free of grease, wax, oil, loose particles, moisture or other foreign matter
 - Questionable surfaces include:
 - Gluelams, LVL's or Microlams = Wood with a wax coating
 - The “wrong” side of the OSB (outside smooth surface)
 - Certain powder-coatings on metal surfaces
 - Primers may be necessary on many surfaces, such as concrete or metal = cold, smooth or wet surfaces that may affect adhesion
 - Typically acrylic or epoxy based primers – Consult manufacturer for recommendation

Applications – Thickness

- Closed-cell SPF (ccSPF) should be sprayed between ½” MIN and 2” per PASS thickness MAX
- Allow time to cool between passes
 - 15-30 mins., depending on ambient/substrate temps
- Open-cell SPF should be sprayed between 4” and 6” per PASS, building up to total thickness in ceilings
 - Less voids or pockets are created when managing thickness and building up to total installed amount
- Testing has been completed to allow for greater thicknesses which may be accepted by code
 - ccSPF = 8” in walls / 12” in cathedral ceilings, protected by sheetrock
 - ocSPF = 12” in walls / 16” in cathedral ceilings, protected by sheetrock

Hot SPF Topic Breakout – Exotherm

- Impact of Spray Polyurethane Foam Exotherm (Heat!) & Pressure on Surfaces and Building Materials
 - Metal Buildings
 - Gypsum Board – Ceilings/Knee Walls
 - Wiring
 - cPVC Sprinkler Pipes & Water Pipes

SPF Applications to Metal Buildings

- Warping may occur if sprayed too thick, too fast
- Must control exotherm (heat) and expansion
 - Especially concerning on lighter weight metal surfaces
 - Use spray techniques
 - Flash coat to isolate heat (1/2" – 1" max – let cool 10 mins)
 - Use flash coat when picture framing to get good adhesion at framing or purlins, and limit volume of SPF creating pressure behind these against metal
 - Lay additional passes after



SPF Applications to Gypsum Board

- Applicators must use caution
 - Warping may occur if sprayed too thick, too fast
 - Must control exotherm (heat) and expansion
 - Use spray techniques
 - Flash coat to isolate heat (1/2" – 1" max – let cool 10 mins)
 - Use flash coat when picture framing to limit volume of SPF creating pressure between framing and sheetrock
 - Lay additional passes after



SPF Applications over Wiring & Plumbing

- SPF to Wiring: Melting-brittleness may occur if sprayed too thick, too fast
 - Standard Romax is not an issue with less than 2" passes
 - Low voltage wiring (Cat-5, security, door bells, garage doors) are very heat sensitive and inner liner can become brittle and short
- SPF to Plumbing: Bursting may occur if sprayed too thick, too fast
 - NOT an issue of chemical incompatibility...industry testing dismissed concerns – SPF CAN be in contact
 - Concern is with heat over pressurized sprinkler pipes, closed off with water, glycol or air – CAN burst due to expansion of contents within the pipe.
- Must control exotherm (heat) and expansion using spray techniques
 - Flash coat to isolate heat (1/2" – 1" max – let cool 10 mins)
 - Use flash coat when picture framing to limit volume of SPF creating pressure between framing and sheetrock
 - Lay additional passes after



SPF Applications over other Hot Surfaces

- Recessed Lighting

- No direct contact with IC- or non-IC rated recessed lights
- 3-inch separation required
 - Gypsum or foil faced boxes
 - Cover with fiberglass batt



- Masonry Fireplaces and Hot Air Flues

- No direct contact with fireplace or flue surfaces
- 3-inch separation required
 - Airspace or fiberglass batt separation

Applications – Fire Protection

- ALL interior SPF must be covered by a thermal barrier, i.e. sheetrock
 - Exceptions
 - Rim joist (Class 1, Less than 3.25" thick)
 - Attics & Crawlspace – Ignition Barrier
 - Lesser requirement – mineral fiber/fiberglass, other products listed in code
 - Check foam products ICC-ES Report for tested and accepted alternatives
 - ALSO applies to all commercial applications
 - Pole barns, sheds, airplane hangars, garages
 - Must have sheetrock OR spray-applied thermal barrier – cannot leave exposed!
 - K-13 (Ure-K) Cellulose by International Cellulose or Monokote Z3306 by WR Grace

Applications – SPF Removal and Disposal

- Removal Guidelines

- Spray foam overspray (small foam particles) can damage many surfaces
 - Ensure that the SPF contractor is properly protecting anything that is not to be foamed.
- SPF is VERY difficult to remove, only a few products work on a few surfaces
 - Clay Magic-car detailing clay bar for smooth surfaces such as glass, metals, vinyl, etc.
 - Silicone & Foam Remover from Home Depot – breaks bond of SPF from surface

Field Quality Control

- The Foam Supplier is the Chemical Manufacturer of the:
 - “A” Isocyanate/Hardener component
 - “B” Resin/Polyol component
- As the Applicator:
 - They are the manufacturer of the end product by blending the Isocyanate and Resin components in the field.
 - The installer is the quality control inspector as well:
 - Brittle & Friable Foam is “A-Rich” or Lacking Resin
 - Soft & Spongy Foam is “B-Rich” or Lacking Isocyanate

Quality Control Procedures

- Before applying, test spray on a disposable surface to check for pattern and proper blend of chemical.
 - After SPF has suitable round pattern, spray 1-2" thickness, allow to cool & cut open to view foam
 - Looking for even, consistent cell structure, no large blown, elongated cells
 - Looking for even color & texture
- Test the surface to be applied to, ensuring the moisture content does not exceed limit to allow for spraying
 - Wood moisture content – less than 18%
 - Moisture strips / Kleenex

Job Site Quality Control Forms

- Each job should have a quality control sheet to record:
 - Job Name/Number
 - Date of application
 - Weather conditions
 - Batch / lot numbers, manufactured date and product name taken from drums
 - Area and Thickness where applied
 - Substrate type
 - Ambient and substrate temperature

Applications - Good Job



Applications - Good Job



Applications - Good Job



Measuring Depth of Insulation



Applications

Good Job



Closed-Cell Processing & Application Problems



- Shrinkage due to over- fill per pass.
- Sprayed at 5" to 6"s at one time.

Applications - Bad Job: Too thick / scorched



Applications - Bad Job: Shrinkage and scorched material – blow holes show excessive exotherm



Applications - Bad Job: Scorching and poor cell structure

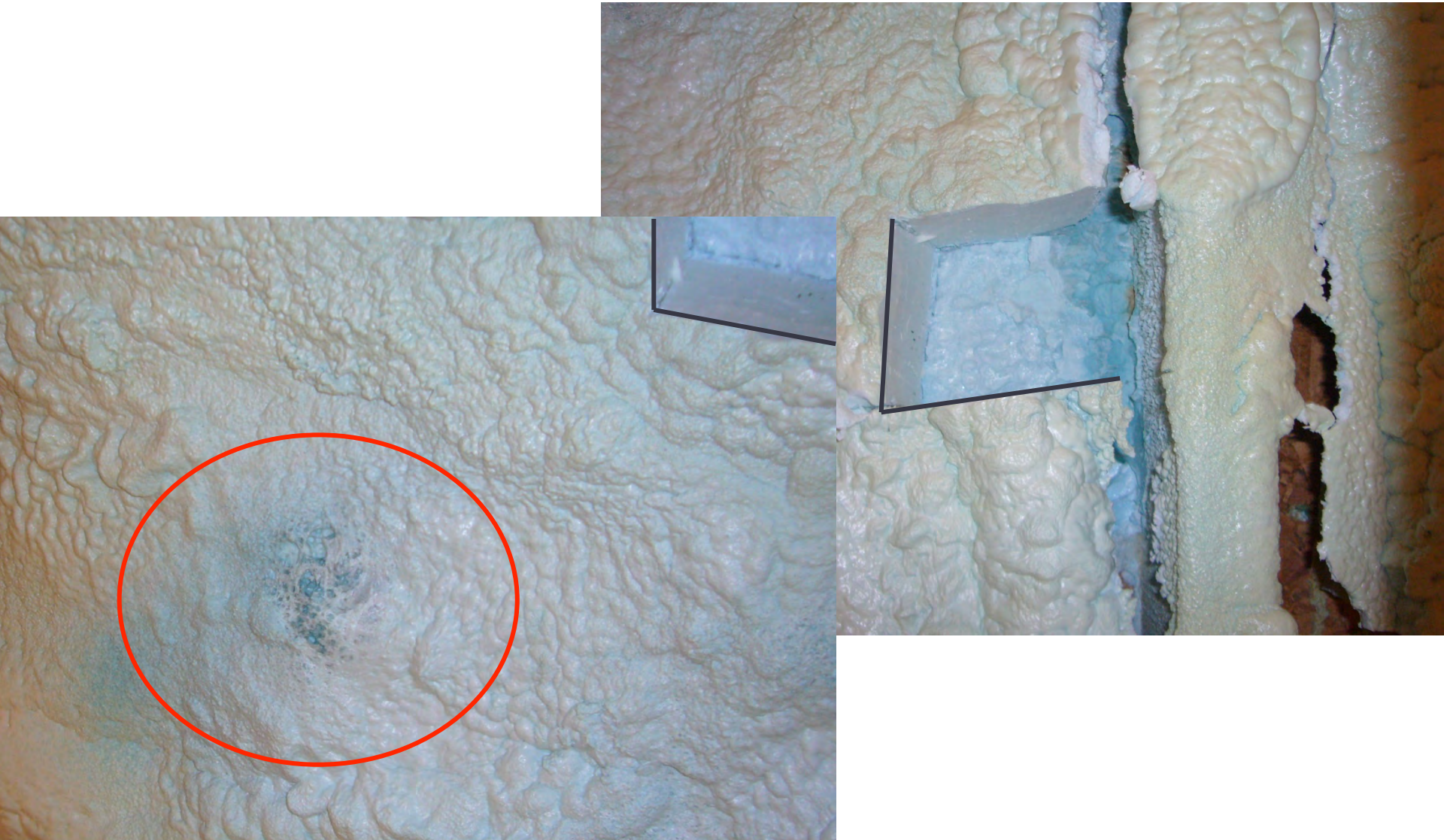


Applications - Bad Job

Equipment problems Light and Dark Color Foam



Applications - Bad Job



Open-cell Processing and Application Issues



Applications - Bad Job: Poor Mixing / Heats



Applications - Bad Job: Poor mixing / temps



Weather Effects on the SPF: MOISTURE

- Creates crystals in ISO drums
- Changes Resin chemical make-up
- Creates poor adhesion on the substrate
- Creates blisters

Weather Effects on the SPF: COLD

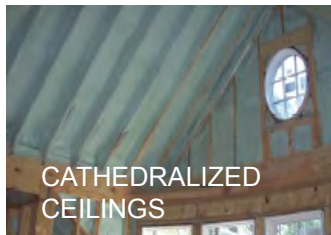
- Colder (thicker) material is harder to process
- Foam proportioner may not be able to heat chemicals to recommended temperatures
- Substrate temperatures will slow down the thermal reaction and could cause thermal shock and shrinkage
- Loss of yield, means more material and more cost

Troubleshooting Guidelines - When having a problem with SPF

- Questions the contractors should ask themselves
- Questions we will ask THEM!
 - What is the temperature of the material in the drum?
 - Is the material too cold?
 - What is the surface you are spraying onto?
 - What temperature is the surface you are spraying onto?
 - Is the substrate too cold or moist?
 - What is the manufacturing date and lot # on the drums?
- Remember when there are problems in the field, they should always STOP and fix it!!!

Anything that is sprayed off-ratio, too thick or too fast will need to be removed and replaced with good material.

Where can you use SPF in residential construction?



courtesy BASF



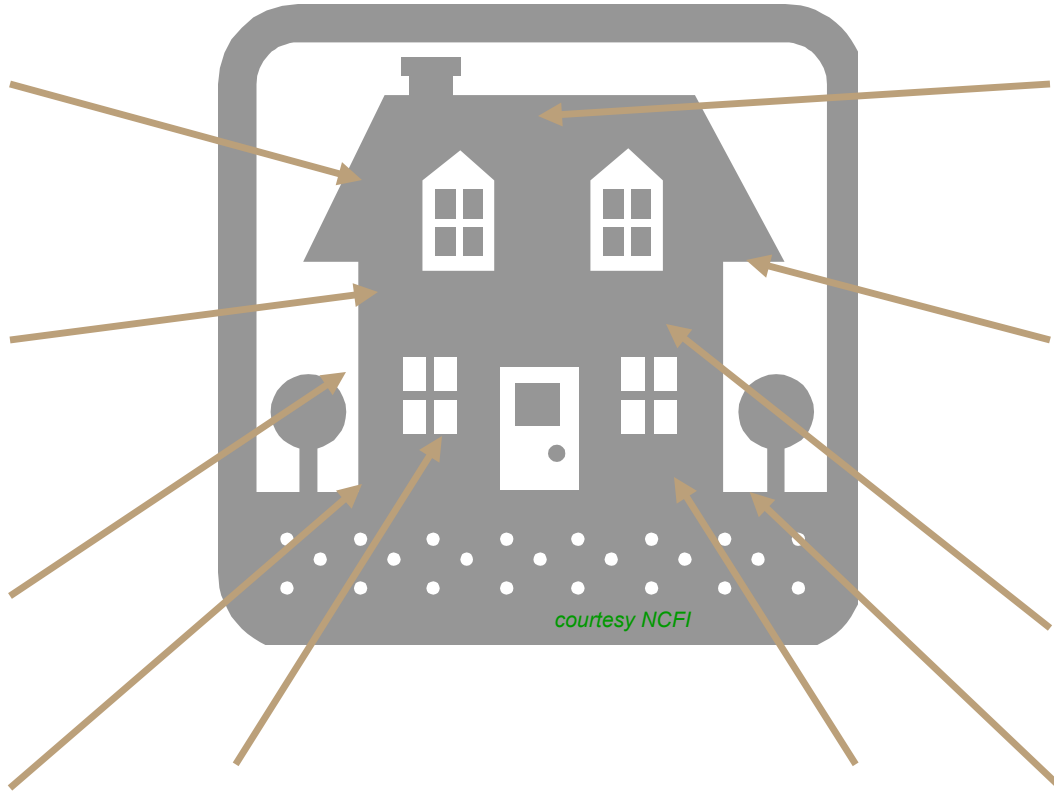
courtesy BASF



courtesy Honeywell/BSC



courtesy Honeywell



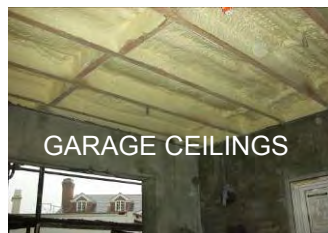
courtesy SPFA



courtesy BASF



courtesy Honeywell



courtesy Honeywell



courtesy BASF



courtesy Honeywell



courtesy BASF

The same great value we see for homes can go into commercial / industrial buildings and applications....



WALLS



TANKS



CEILINGS

Spray Polyurethane Foam Insulation Application Areas

CAVITY INSULATIONS	Performance					Applications						
	R-value	Air Barrier	Vapor Retarder	Waterproof	Structural	Walls	Ceilings (flat)	Sealed Attics	Cathedral Ceil.	Basements	Rim Joists	Retrofit
Cellulose Wet-Spray	3.7					*			*			
Cellulose Loosefill	3.5 to 3.8					*	***		*			
Fiberglass Batts	3.2 to 4.3		y			**	*		*	*	*	
Fiberglass Loosefill	4.2 to 4.4					*	***		*			**
Open-Cell SPF	3.4 to 3.8	Y				**	*	**	**		**	
Closed-Cell SPF	5.9 to 7.1	Y	Y	Y	Y	***	*	***	***	***	***	**

Know the best place to use it!

SPF Myths - What about rigidity and long-term adhesion?

- Closed-cell spray foam has been used successfully for residential and commercial construction for over 30 years
 - Exhibited dependable performance, when applied properly, in extreme weather conditions, without loss of adhesion or bond
- Properties that enhance it's performance...



Elasticity

Mechanical / Chemical Bond

Racking Strength

SPF Myths -

What about Flammability and Fire?

- Most foam systems for residential construction are Class 1 rated construction materials
 - Contains fire retardants and smoke suppressants
- Class 1 exceeds Class 2 requirements of International Residential Code
- ALL FOAM INSULATION applications (open cell, closed-cell spray, rigid board, etc.) for interior use must be covered with thermal barriers, i.e. ½" Gypsum Board, for fire safety, with few exceptions (per IRC and IBC requirements)

SPF Myths - What about Roof Leaks?

- Closed-cell spray foam acts as a secondary rain barrier, ESPECIALLY valuable in a coastal zones and rain prone areas, to keep the elements out of the home prior to repairs during high wind events and damages
- Open cell foam MAY let the water flow through, but can also retain moisture against the sheathing
 - Water will also migrate within foam mass before showing up usually
- Consider the BENEFITS of closed-cell SPF on the underside of your roof..
 - Would you rather have water in your living room, or within one section of the roof sheathing? Easier to identify and repair...
 - Damage is limited to a specific area, not allowed to move or create additional damage and mold potential

SPF Myths -

What about Outgassing and Air Quality?

- No Urea Formaldehydes in SPF chemistry - Never had them, Never will
- HFC-245fa is a non-flammable that replaced HCFC and CFC blowing agents.
 - Zero Ozone Depletion Potential (ODP)
 - Low Global Warming Potential (GWP)
 - Not considered a Volatile Organic Compound (VOC) in US
- Inert Plastic Remains in place - No outgassing
 - Studies by AMA and others to prove no physical effect
- Locally used in American Lung Association Health House
 - Asthmatic daughter – benefited from a well-sealed assembly
 - Non-fibrous insulation is a bonus

SPF Myths –

Can a new home be built “too tight”? No!

- Fresh Air Ventilation Standards - **ASHRAE 62.2.1**
 - This standard defines the roles of and minimum requirements for mechanical and natural ventilation systems and the building envelope intended to provide acceptable indoor air quality in low-rise residential buildings. It is ASHRAE's IAQ standard for residential buildings.
 - It applies to spaces intended for human occupancy within single-family houses and multi-family structures of three stories or fewer above grade, including manufactured and modular houses.

Build Tight, Ventilate Right

- To address air infiltration and related moisture concerns, many building scientists have concluded that houses should be as tight and seamless as possible¹
- The American Lung Association also recommends that homes need to be as tight as practical²
- Random natural infiltration should be minimized and controlled mechanical ventilation should be employed³

1. Arnie Katz, Director, Affordable Housing, Senior Building Science Consultant
buildings/about/specialists/arnie_katz.html

www.advancedenergy.org/

2. American Lung Association www.healthhouse.org/build/TopTenQuestionsbooklet.pdf

3. www.buildingscience.com

Fresh Air Ventilation



Trends in Ventilation and Indoor Air Quality Control

- ERV and HRV are becoming more affordable
- Commissioning of homes is becoming more widespread
- As with all air-tight building approaches, homes built with spray foam should incorporate a method to manage indoor air quality
 - Fresh air should be introduced and exchanged within the home
 - Passive and low cost methods available
 - Home Ventilating Institute www.hvi.org
 - Honeywell and Aprilaire have affordable models
 - Easily adapted onto existing HVAC equipment

SPF Contractor Selection

- Things to look for in a qualified applicator of SPF:
 - Industry Training (SPFA)
 - Manufacturer Training (BASF, Icynene, etc.) for applicators, sales staff, owners, etc.
 - Manufacturer Certification
 - Manufacturer Quality Programs (BASF, Bayer, etc.)
 - Hours of Spraying or Square Footage Sprayed
 - Years of experience



Selecting a SPF Contractor with Experience – Center for Polyurethanes Guidance

- Here are some questions you may wish to ask a prospective SPF contractor before selection:
 - Has the supervisor been trained or accredited for high- and/or low-pressure two-component spray polyurethane foam installation? Is the accreditation current or training recent?
 - Ask for evidence that your contractor has had training by an SPF manufacturer or distributor.
 - The Spray Polyurethane Foam Alliance (SPFA) accreditation program or the Center for the Polyurethanes Industry (CPI) SPF Chemical Health and Safety Training are some other choices.
 - Have all the workers, including applicators and helpers had training?
 - Do you have adequate insurance?
 - How much experience do you have in installing spray polyurethane foam for this application?
 - What references do you have for similar jobs?
 - Who will be supervising the job?

Selecting a SPF Contractor with Experience – Center for Polyurethanes Guidance

- Here are some additional questions on safety to ask a prospective SPF contractor before selection:
 - Describe your company's safety record.
 - Do you keep Material Safety Data Sheets (MSDS) for the SPF products readily available?
 - Do you have a Respiratory Protection Program for workers and can you share a copy?
 - Has someone on the worksite received the U.S. Occupational Safety and Health Administration (OSHA) 10-hour training?
 - What safety precautions do you typically undertake to protect the general population and nearby property?
 - When can the general public re-enter the building following application?
 - How can I reach you if I have questions after the job is completed?

Making the correct choice

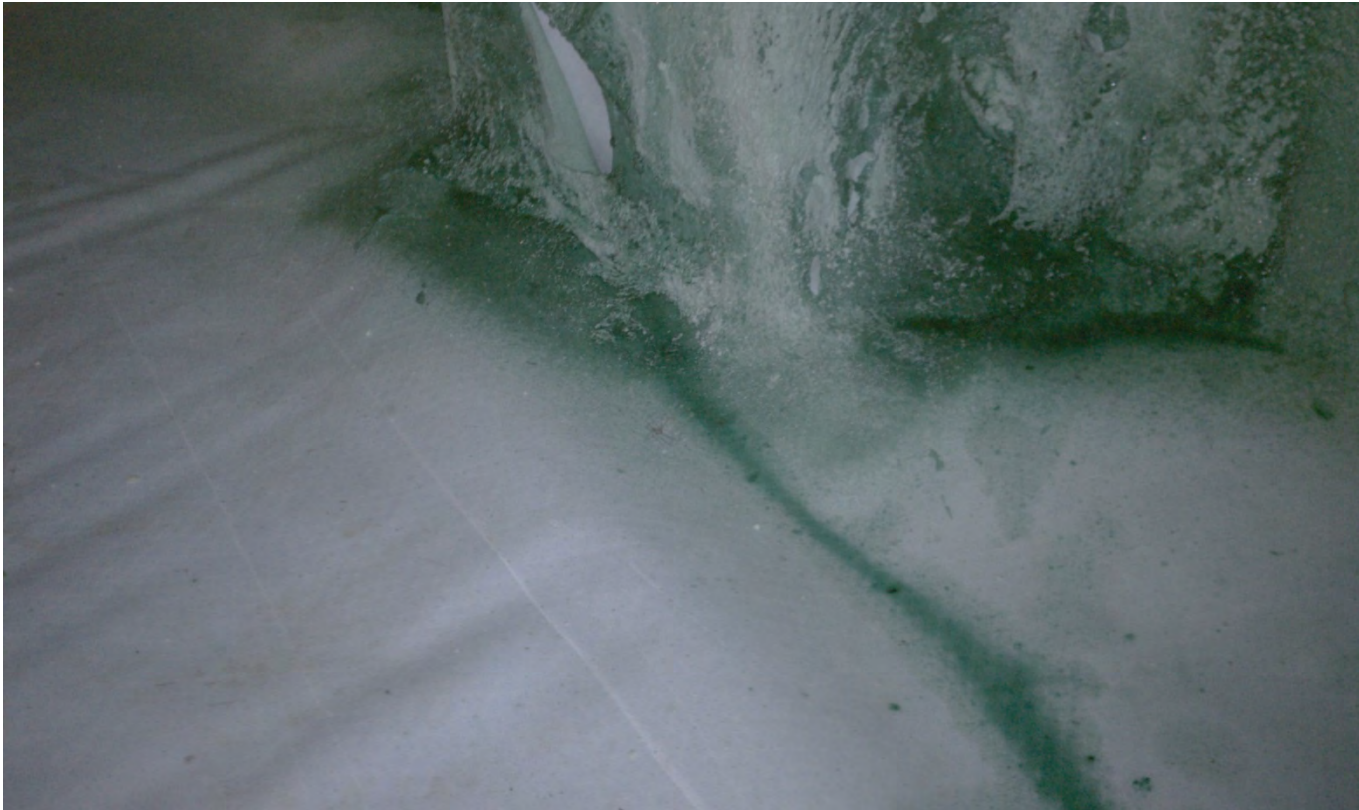
“The Bitterness of Poor Quality Lingers Long After
The Sweetness of Low Cost is Forgotten”

- Benjamin Franklin

choices



Choices



Choices



Choices



Choices



Choices



Documentation: Insulation Cards for Spray Foam (per IRC N1101.8)

INSULATION CARD - DO NOT REMOVE



The Chemical Company

ICC-ESR - 2642

ICC-ESR - 3102

This form must be filled out and posted to comply with building code and FTC requirements. Meets IRC Section N1101.4 requirements. Please post near electrical panel.

PLEASE ATTACH PRODUCT TECHNICAL DATA SHEET BEFORE POSTING

The following spray polyurethane foam insulation system(s) has been installed. Consult International Building Code, Section 2603 Foam Plastic Insulation, International Residential Code (IRC) R314 Foam Plastics, or International Energy Conservation Code (IECC) Section 102 for specific requirements.

This spray polyurethane foam insulation system has been installed in accordance with manufacturer's processing guidelines to provide a thermal resistance of...

Area Insulated	R-Value	Thickness*
Attic Area	R- <input type="text"/>	<input type="text"/> Inches
Sloped Ceilings	R- <input type="text"/>	<input type="text"/> Inches
Walls (Where:)	R- <input type="text"/>	<input type="text"/> Inches
Walls (Where:)	R- <input type="text"/>	<input type="text"/> Inches
Floors (over an unheated crawl space)	R- <input type="text"/>	<input type="text"/> Inches
Crawl Space Perimeter	R- <input type="text"/>	<input type="text"/> Inches
Basement Exterior Walls	R- <input type="text"/>	<input type="text"/> Inches
Other (Where:)	R- <input type="text"/>	<input type="text"/> Inches

*Nominal thicknesses are representative of a field, spray-applied foam material.

BASF Corporation Product(s) installed:

(Please Print Clearly)

Walls: ☐ COMFORT FOAM® ☐ SPRAYTITE® ☐ ENERTITE® Permeance: _____ perms at _____" thickness Density: _____

Flame Spread Rating (ASTM E-84): ☒ Class 1 (25 or less) ☐ Class 2 (75 or less) tested at _____" thickness**

Other: ☐ COMFORT FOAM® ☐ SPRAYTITE® ☐ ENERTITE® Permeance: _____ perms at _____" thickness Density: _____

Flame Spread Rating (ASTM E-84): ☒ Class 1 (25 or less) ☐ Class 2 (75 or less) tested at _____" thickness**

Basement Exterior: ☐ COMFORT FOAM® ☐ SPRAYTITE® Permeance: _____ perms at _____" thickness Density: _____

Flame Spread Rating (ASTM E-84): Not Applicable
(Please Print Clearly)

Jobsite Location: _____ Date Installed: _____

Building Contractor: _____

Insulation Contractor: _____ Phone: _____

Installed By: _____

Caution—No Hot Work—Polyurethane foam is combustible and should be treated as such. No welding or cutting unless foam has been protected from accidental ignition by open flame.

INSULATION CARD - DO NOT REMOVE

INSULATION CARD - DO NOT REMOVE

**Per the IRC foam plastic insulation greater than 4 inches thickness shall have a maximum flame spread index of 25 and a smoke-developed index of 450 where tested at a minimum thickness of 4 inches, provided the end use is approved in accordance with Section 2603.9 Special Approval, using the thickness and density intended for use.

Test Agency:	Intertek ETL SEMKO	Issue Date:	May 2, 2007
Test Report #:	3116019-001 (a, b, c) 3116019-002 (a, b, c)	Product Tested:	SPRAYTITE® and COMFORT FOAM®
Testing and Compliance Criteria: Applicable requirements of NFPA 285 and IBC Section 803.2			
Evaluation Property: Heat Release and Flame Spread			
Constructions: (covered in 1/2" gypsum to interior)	Exterior Walls 8" Spray Foam	Ceiling Assembly 12" Spray Foam	
Test Report Conclusion: The sample submitted, installed, and tested as described in this report displayed low levels of heat release, and low upper level temperatures. The heat flux on the floor did not reach flashover levels. The sample did not spread flames to the ceiling during the 40 kW exposure. The flames did not spread to the extremities of the 12-foot walls, or the rear 8-foot wall during the test. The sample did not exhibit flashover conditions during the test. NFPA 386 does not publish pass/fail criteria. One must consult the codes to determine pass/fail. This specimen <u>did</u> meet the criteria set forth in the 2003/2006 IBC Section 803.2.			

Caution—No Hot Work—Polyurethane foam is combustible and should be treated as such. No welding or cutting unless foam has been protected from accidental ignition by open flame.

What You Should Know About R-values
These charts show the R-value of this insulation. R means resistance to heat flow. The higher the R-value, the greater the insulating power. Compare insulation R-values before you buy. There are other factors to consider. The amount of insulation you need depends mainly on the climate you live in. Also, your fuel savings from insulation will depend upon the climate, the type and size of your house, the amount of insulation already in your house, and your fuel use patterns and family size. If you buy too much insulation, it will cost you more than what you'll save on fuel. To get the needed R-value, it is essential that this insulation be installed properly.

BASF Corporation
13530 Waterhouse Circle
Minneapolis, MN 55441
Tel: 600-758-0712
www.apf.basf.com



ISO 9001:2000 Accredited Facilities—Minneapolis, MN and Houston, TX

INSULATION CARD - DO NOT REMOVE

Documentation: CPI Online Training Certificate of Completion

Recognition of Completion

OMAN, BRIAN

ID Number: 0000000077

successfully completed

HIGH PRESSURE SPF - SAFETY TRAINING

presented by

**The Center for the Polyurethanes Industry of the
American Chemistry Council**

Instructor: *ONLINE*

Completed: 01/30/2013

Expiration: 01/30/2015

Course Code: ACCSPF001



Recognition of Completion
**HIGH PRESSURE SPF -
SAFETY TRAINING**

Name: OMAN, BRIAN

ID Number: 0000000077

Course Code: **ACCSPF001**

Completed: 01/30/2013

Expiration: 01/30/2015

Instructor: **ONLINE**

Documentation: ICC Evaluation Reports

- Use to validate manufacturer and contractor claims.
- Effective February 1st, 2011, all ESR's were required to be updated with new test protocols including Appendix X for attic and crawlspace applications.
- Go to www.icc-es.org to view updated reports

ICC EVALUATION SERVICE
Most Widely Accepted and Trusted

ICC-ES Evaluation Report
ESR-2642¹
Reissued February 1, 2010
This report is subject to re-examination in two years.

www.icc-es.org | (800) 423-6587 | (562) 639-6543 A Subsidiary of the International Code Council[®]

DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION
Section: 07 21 00—Thermal Insulation
REPORT HOLDER:
BASF POLYURETHANE FOAM ENTERPRISES, LLC
13830 WATERTOWER CIRCLE
MINNEAPOLIS, MINNESOTA 55441
(800) 888-3342
www.basf-foam.com

EVALUATION SUBJECT:
BASF POLYURETHANE FOAM ENTERPRISES' SPRAY-APPLIED INSULATIONS: SPRAYTITE[®] (158, 178, 81205 AND 81206); COMFORT FOAM[®] (158 AND 178) AND WALLTITE[®] (US AND US-N)

1.0 EVALUATION SCOPE
Compliance with the following codes:
 ■ 2009 International Building Code[®] (IBC)
 ■ 2009 International Residential Code[®] (IRC)
 ■ 2009 International Energy Conservation Code[®] (IECC)
 ■ Other Codes (see Section 8)
Properties evaluated:
 ■ Physical properties
 ■ Surface burning characteristics
 ■ Water vapor transmission
 ■ Attic and crawlspace installation
 ■ Air permeability
 ■ Fire-resistance-rated construction
 ■ Exterior walls in Types I through IV construction

2.0 USES
SPRAYTITE[®] (158, 178, 81205 and 81206), COMFORT FOAM[®] (158 and 178) and WALLTITE[®] (US and US-N) spray-applied polyurethane foam insulations are used as nonstructural thermal insulating material in Type I, II, III, IV and V construction under the IRC and dwellings under the IECC. See Section 4.5 for use in Type I, II, III, IV and V construction. The insulation is for use in wall cavities, floor/ceiling assemblies, or attic and crawlspace as described in Section 4.4. Under the IRC, the insulation may be used as air-impermeable insulation when installed in accordance with Section 3.5. The insulation may be used in fire-resistance-rated wall assemblies in Type I construction in accordance with Section 4.5.

3.0 DESCRIPTION
3.1 General:
SPRAYTITE[®] (158, 178, 81205 and 81206), COMFORT FOAM[®] (158 and 178) and WALLTITE[®] (US and US-N) are two-component, closed-cell, rigid foam plastic insulations. The insulations are produced in the field by combining an isocyanate component A with a resin component B, resulting in products having a nominal density of 2.0 pcf (32 kg/m³). SPRAYTITE[®], COMFORT FOAM[®] and WALLTITE[®] insulations use an A component designated as ELASTODIPRAV[®] 8000A. Each insulation uses a different proprietary blend for the B component. The insulation components A have a shelf life of three months and components B have a shelf life of nine months when stored in factory-sealed containers at temperatures between 50°F (10°C) and 80°F (27°C) before installation.
3.2 Surface-burning Characteristics:
The insulations have a flame-spread index of 25 or less and a smoke-developed index of 450 or less when tested in accordance with ASTM E 84 at a maximum thickness of 4 inches (102 mm).
Thicknesses of up to 8 inches (203 mm) for wall cavities and 12 inches (305 mm) for ceiling cavities are recognized, based on testing in accordance with NFPA 285, when covered with a minimum 1/2-inch-thick (12.7 mm) gypsum board or an equivalent thermal barrier complying with, and installed in accordance with, the applicable code.
3.3 Thermal Resistance, R-values:
The insulations have thermal resistance (R-values) at a mean temperature of 75°F (24°C) as shown in Table 1.
3.4 Vapor Retarder:
The insulations have a vapor permeance of less than 1 perm [5.7 x 10⁻¹¹ kg/(m²sPa)], in accordance with ASTM E 96, when applied at the following minimum thicknesses and qualify as Class II vapor retarders:
 SPRAYTITE[®] (158, 81205) ■ 3 inches (76 mm)
 SPRAYTITE[®] (178, 81206) ■ 2 inches (51 mm)
 COMFORT FOAM[®] (158) ■ 3 inches (76 mm)
 COMFORT FOAM[®] (178) ■ 2 inches (51 mm)
 WALLTITE[®] (US and US-N) ■ 2 inches (51 mm)
3.5 Air Permeability:
SPRAYTITE[®] (178 and 81206), COMFORT FOAM[®] (178 and WALLTITE[®] (US and US-N) spray-applied polyurethane foam insulations, at a minimum thickness of 1 inch (25.4 mm), are considered air-impermeable insulation in accordance with Section R605.4 of the IRC, based on testing in accordance with ASTM E 283.

Revised February 2011

ICC-ES Evaluation Reports are not to be construed as representing a contract or any other relationship. They are not to be construed as an endorsement of the subject of the report or a recommendation for its use. There is no warranty, expressed or implied, by ICC Evaluation Service, LLC, superior or equal, in any building or other product to the report, or in any product covered by the report.

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Documentation: Product Technical Data Sheets

BASF
The Chemical Company

Technical Product Data

SPRAYTITE® 178 Series

BUILDING ENVELOPE INSULATION
ICC ESR-2642

DESCRIPTION

SPRAYTITE 178 is a two-component closed-cell spray polyurethane foam system utilizing an EPA-approved, zero ozone-depleting blowing agent. It is designed for use in residential construction insulation system applications. SPRAYTITE 178 is compatible with most common construction materials, but can only be processed with ELASTOL-200A isocyanate. The benefits of SPRAYTITE 178 include:

- Superior insulation
- Controls moisture infiltration
- Controls air infiltration
- Non-toxic
- Structural enhancement

TYPICAL PROPERTIES⁽¹⁾

PROPERTY	METHOD	SPRAYTITE 178
Resin:		
Specific Gravity @ 70°F	ASTM D 1538	1.175
Viscosity @ 70°F (cps)	Brookfield	500
Cured Foam:		
Density, core (pcf @ 2" lifts)	ASTM D 1622	2.0 – 2.3
Thermal Resistance (aged) k-factor (Btu in/ft ² hr °F)	ASTM C 518	0.145 @ 1-in thick 0.145 @ 4-in thick
R-value (ft ² hr °F/Btu in) ⁽²⁾	Calculated	6.7 / in @ < 4-in thick 6.9 / in @ ≥ 4-in thick
Compressive Strength (psi)	ASTM D 1621	26 ± 5% ^A
Water Vapor Transmission – Permeability (perm-inch)	ASTM E 96	1.39
Water Vapor Transmission – Permeance (perms)	ASTM E 96	1.39 @ 1" thickness 0.70 @ 2" thickness 0.46 @ 3" thickness 0.35 @ 4" thickness
Water Absorption (vol %)	ASTM D 2842	0.60
Tensile Strength (psi)	ASTM D 1623	62.4 (Type C)
Response to Thermal and Humid Aging (% linear change)	ASTM D 2126	4.9
Closed Cell Content (%)	ASTM D 6226	98
Surface Burning Characteristics		
Flame Spread Index ⁽³⁾	ASTM E 84	≤ 25
Smoke Developed Index	ASTM E 84	≤ 350

ADDITIONAL TESTING, APPROVALS & CERTIFICATIONS:

- ASTM E 84 (Class I) with Product Listing
- ICC-ES Evaluation Report ESR-2642
- ASTM C 1025 – Type I Compliant
- AIR LEAKAGE
- NFPA 286 per IBC Section 803.4
- Approved for Attics & Crawl Spaces installations with and without prescriptive ignition barriers per ICC-ES A-377, Appendix A1.2.2 and Appendix S
- Florida Building Code Approval
- FL 13001.1 – Spray Polyurethane Foam Adhesive System: Filler Application (Outside HVHZ - 100 psf design pressure)
- FL 13001.2 – Spray Polyurethane Foam Adhesive System: Full Insulating Layer Application (Outside HVHZ - 200 psf design pressure)
- California Bureau of Electronic and Appliance Repair, Home Furnishings and Thermal Insulation

SPRAYTITE 178 has been tested and is considered a Very Low VOC Emitting Product per environmental chamber test following ASTM D 5115 or ASTM D 5570.

SPRAYTITE 178 has high microbial resistance and is suitable for use in homes, schools and commercial buildings.

Complies with GREENGUARD Test Method, "Method for Measuring Microbial Resistance from Various Sources Using Static Environmental Chamber" according to ASTM D 6595-06.

Order level of spray polyurethane foam is dependent on proper application using the recommended processing parameters.

Please contact your local Sales or Technical Representative for specific questions regarding SPRAYTITE 178 properties, approvals, or certifications.

(1) The data sheet shows the R-value of this insulation. R¹⁷⁸ means resistance to heat flow. The higher the R-value, the greater the insulating power. Compare insulation R-values before you buy. There are other factors to consider. The amount of insulation will depend upon the climate, the type and size of your house, and the fuel-use patterns and heavy use. If you buy too much insulation it will cost you more than what you will save on fuel. To achieve proper R-values, it is essential that this insulation be installed properly.

(2) This numerical flame spread rating does not reflect hazards presented by this or any other material under actual fire conditions. Polyurethane foam systems should not be left exposed and must be protected by a minimum 15-minute thermal barrier or other code-compliant material as required by applicable building codes and Code Officials. Building Codes provide guidelines regarding minimum requirements. Further information is available at www.basf.com. Consult all authorities having jurisdiction (AHJ) over or near for additional or specific requirements prior to beginning any project.

(3) ASTM E 84 is a test designed for samples thicknesses up to four (4) inches. NFPA 286 is a burning room test designed to evaluate test conditions of large-scale assemblies to evaluate foam thickness in excess of four (4) inches.

(4) The AHJ (Authority Having Jurisdiction) is the responsible party for measurement of the equipment.

SPRAYTITE 178 Series

REVISIONS

Revision 1: December 10, 2010

Page 1 of 2

Polyurethane Solutions

BASF Corporation
1703 Grasspoint Avenue
Houston, TX 77054
(800) 706-0712, (713) 658-0945 (Fax)
www.basf-basf.com

TYPICAL PROPERTIES⁽¹⁾

PROPERTY

METHOD

SPRAYTITE 178

Resin:

Specific Gravity @ 70°F

ASTM D 1638

1.175

Viscosity @ 70°F (cps)

Brookfield

500

Cured Foam:

Density, core (pcf @ 2" lifts)

ASTM D 1622

2.0 – 2.3

Thermal Resistance (aged)

ASTM C 518

0.149 @ 1-in thick

k-factor (Btu in/ft² hr °F)

ASTM C 518

0.145 @ 4-in thick

R-value (ft² hr °F/Btu in)⁽²⁾

Calculated

6.7 / in @ < 4-in thick

6.9 / in @ ≥ 4-in thick

Compressive Strength (psi)

ASTM D 1621

26 ± 5%^A

Water Vapor Transmission –

ASTM E 96

1.39

Permeability (perm-inch)

ASTM E 96

1.39 @ 1" thickness

Water Vapor Transmission –

ASTM E 96

0.70 @ 2" thickness

Permeance (perms)

ASTM E 96

0.46 @ 3" thickness

0.35 @ 4" thickness

Water Absorption (vol %)

ASTM D 2842

0.60

Tensile Strength (psi)

ASTM D 1623

62.4 (Type C)

Response to Thermal and

Humid Aging (% linear change)

ASTM D 2126

4.9

158°F / 97% RH / 168 hrs

ASTM D 6226

98

Closed Cell Content (%)

ASTM D 6226

98

Surface Burning Characteristics

Flame Spread Index⁽³⁾

ASTM E 84

≤ 25

Smoke Developed Index

ASTM E 84

≤ 350

The coefficient of thermal expansion varies between 3×10^{-5} and 4×10^{-4} 1/K or 1.5×10^{-5} and 2×10^{-4} 1/°F. The lower end of the range relates to closed-cell SPF while the higher values were reported for open-cell foams.

What are the Benefits of SPF?

Uses - Benefit	Fiberglass Batts	Cellulose	XPS	EPS	Open Cell SPF	Closed Cell SPF
Insulation (R/inch)	3.0-4.0	3.0-4.0	5.0	3.0-4.0	3.6 -4.5	5.8-6.8
Air Barrier/Air Impermeable			✓		✓	✓
Water Vapor Retarder	*		✓			✓
Water Resistant			✓			✓
Cavity Insulation	✓	✓			✓	✓
Continuous Insulation			✓	✓	✓	✓
Low-Slope Roofing (Ext)			✓	✓		✓
Formaldehyde-Free	*	✓	✓	✓	✓	✓
Structural Strength						✓

Residential / Light Commercial Applications with Open-cell SPF



Open-cell 1/2# SPF for residential and light commercial structures (garage, barns, etc.)

- 2-4x the installed cost of conventional insulation, but energy savings also allow greater payback than most insulation materials – more than just insulation:
 - High expansion-fills studs
 - Speedy, single pass application
 - Air barrier performance
 - Higher insulation performance (similar R-value to conventional)
 - Moisture & vapor permeable
 - Non-structural
 - Sound absorption & control

Residential / Light Commercial Applications with Closed-cell SPF



- Closed-cell 2# SPF for residential and light commercial structures (garage, barns, etc.)
 - 3-5x the installed cost of conventional insulation, but greater energy savings over time than any other insulation system – more than just insulation:
 - Controlled expansion, can be used in combination approach with other insulations in cavity
 - Adds strength - Straighter, stronger walls
 - Storm resistance in sealed attics
 - Highest insulation performance
 - Moisture and vapor resistance
 - Superior air barrier material
 - Sound barrier

Questions?

- Spray foam product questions?
- Application questions?
- OSHA Compliance and safety questions?

Thank you for your time and attention today!

THANK YOU!

BASF Corporation is committed to sustainable solutions for construction applications.

www.spf.basf.com

888-900-FOAM

Brian Oman – Application Specialist

Brian.Oman@basf.com

612-600-0750 (cell)

