

# Spray What? Spray Polyurethane Foam: Sealants and Insulation

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MORRISON HERSHFIELD

# What we will cover today

- What is Spray Foam?
- Different types of “spray foam” available on the market today
- The benefits and challenges of using spray foam
- Building code and Applicable Standards
- Troubleshooting – Tales from the field
- Changes coming to the industry
- SPF Quality Assurance Programs

# Scary Stuff?

After this presentation, you no longer need to feel afraid....

...Spray foam does not need to be scary stuff.





# What is Spray Polyurethane Foam?

# SPF Common Uses

## SPF's Many Common Uses and Benefits



### Wall Insulation

Maintains indoor air temperature, seals cracks and improves energy efficiency



### Roofing

Protects against moisture, improves energy efficiency and increases wind resistance



### Sealant

Minimizes air leaks, reduces sound, seals windows and doors, and helps keep out insects, rodents and allergens



### Manufactured Homes

Serves as an adhesive for wall and ceiling panels



### Containers

Insulates tanks or vessels for liquids that need to maintain a consistent temperature



### Warehouses

Insulates refrigerated warehouses, meat and dairy processing plants, and distribution centers for frozen foods and fresh produce

# The many names of Spray Foam

**SPF**

**ccSPF/ocSPF**

**SAPF**

**SPFI**

**SPUF**

**SAPUFI** (ok I made this one up)

# What is Spray Foam



## Foam Sealant vs. Foam Insulation



# Types of Open Cell SPF

- Open-Cell Spray **Foam Sealant**
  - 1 component – 18-30 oz. cans
  - 2 component – propane tank style
- Open-Cell Spray **Foam Insulation**
  - 2 component – commercial equipment – ½ lb light density foam insulation

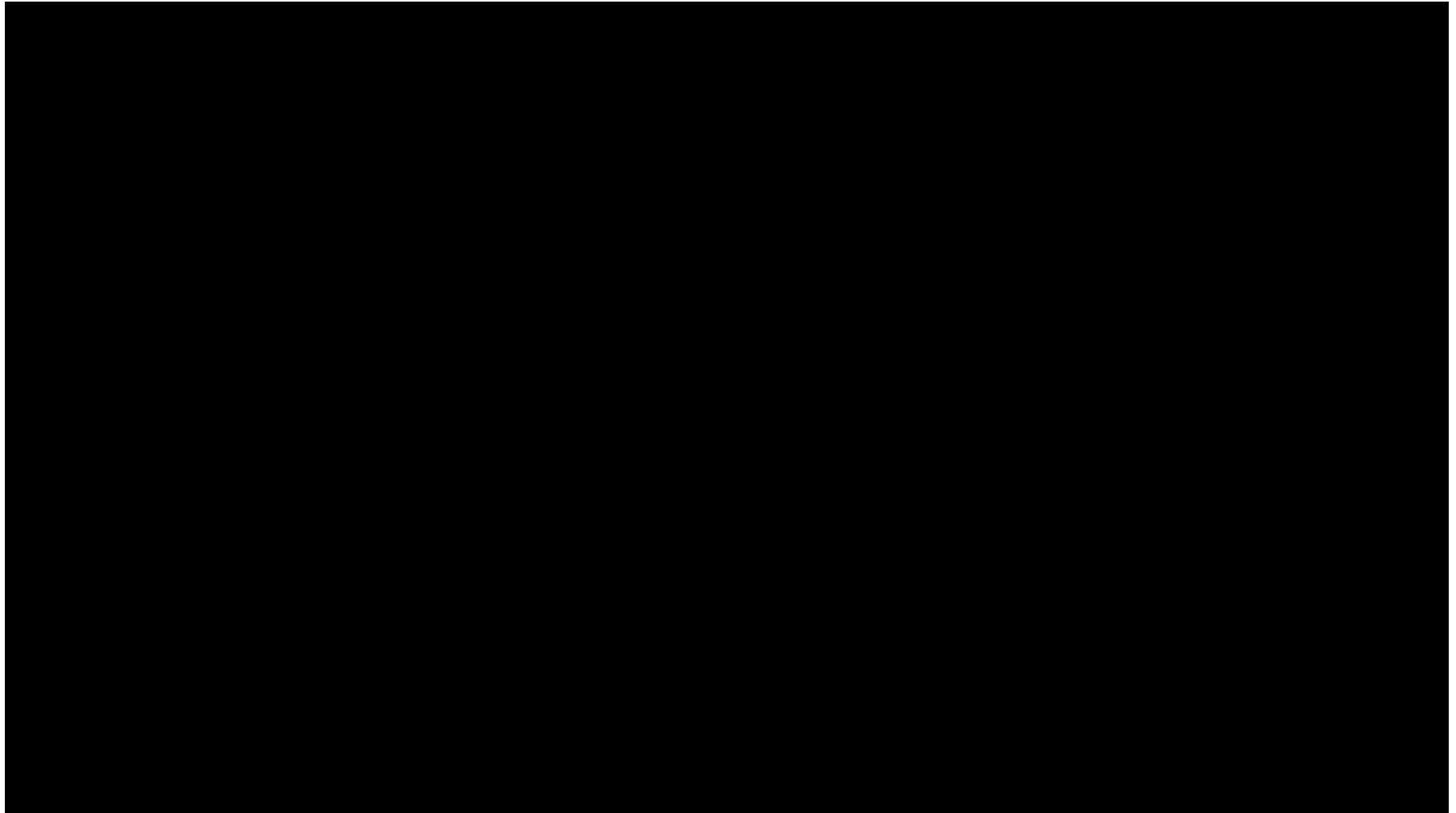




# Open Cell Foam Insulation - 1/2 lb Density



# Open Cell Foam Insulation - 1/2 lb Density



## 1/2 lb – Light Density Foam Insulation

- Density – 0.4 to 0.7 lb/ft<sup>3</sup>
- R-value – R 3.4 to 4.0 per inch (refer to published **LTTR** charts).
- **Interior use only**
- Good acoustic qualities (STC 39)
- Expands about 100 times from its liquid state
- Up to 12” per pass
- White in colour
- **NOT A VAPOUR BARRIER!**

# Types of Closed Cell SPF

- Closed-Cell Spray Foam Sealant
  - 1 component – 18-30 oz. can
  - 2 component – propane tank style



## 2 lb – Medium Density Foam Insulation



### Closed-Cell Spray **Foam** Insulation

2 component – commercial equipment – 2lb medium density foam insulation



## 2 lb – Medium Density Foam Insulation

- Density – 1.8 to 2.3 lb/ft<sup>3</sup>
- R-value – R 5.0 to 6.7 per inch (refer to manufacturer's published **LTTR**).
- Interior or exterior use (can be left exposed up to 6 months) – outer skin changes colour when left exposed to UV.
- Expands 30 - 40 times from its liquid state
- Maximum 2" per pass
- Colour varies per manufacturer

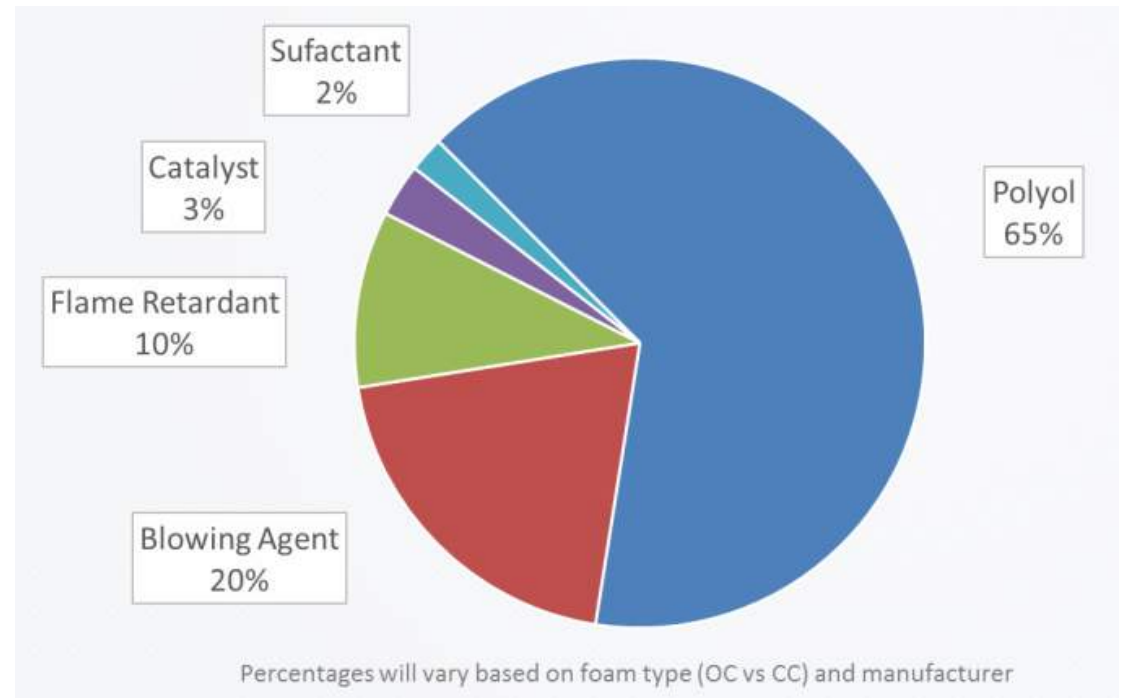


# Two Component SPF Composition

Side A: Isocyanate (Iso)

Side B: Polyol (Resin) material

Polyols - 65%,  
Surfactants - 2%,  
Catalysts - 3%,  
Blowing Agents - 20%,  
Fire Retardants - 10%



B Side Composition

Note: Percentages will vary based on OC/CC and Manufacturer



## 3 lb – High Density Foam Insulation

- Density – 2.5 - 3.2 lb/ft<sup>3</sup>
- R-value – R 6.0-7.0 per inch (refer to manufacturer's published **LTTR**).
- Exterior use – roofing only (should be covered almost immediately)
- Should be covered with a tough, elastomeric waterproof coating
  - e.g. polyurea, silicone, s, etc.
- Expands 10-20 times from its liquid state
- No Canadian material or installation standards

# 3 lb – High Density Foam Insulation



# So where should I specify/use foam sealants?



Voids, Gaps, Cracks but not full cavities

Image Courtesy: Home depot, Youtube

# That Burning Question

Can I use a  
foam sealant  
as a foam  
insulation?



Image Courtesy Pinterest "Foam DIY"

# Speaking of Burning





# Code Requirements

## Part 9

# Foamed Plastic Insulation

- 9.10.17.10.1) ...foamed plastics which form part of a wall or ceiling assembly ... **shall be protected from adjacent space in the building, other than adjacent concealed spaces within attic or roof spaces, crawl spaces, and wall assemblies, by**
  - a) one of the interior finishes described in Subsections 9.29.4 to 9.29.9
  - b) sheet metal mechanically fastened to the supporting assembly independent of the insulation and having a thickness of not less than 0.38 mm and a melting point not below 650°C, provided the building does not contain a Group C major occupancy, or
  - c) **any thermal barrier that meets the requirements of Clause [3.1.5.12.\(2\)\(e\)](#).**
- 9.33.6.4.5) Except as provided in Sentence (6), foamed plastic insulation **shall not be used as part of an air duct or for insulating an air duct.**
- 9.33.6.4.6) Foamed plastic insulation **is permitted to be used in a ceiling space that acts as a return air plenum provided the foamed plastic insulation is protected from exposure to the plenum in accordance with Sentence 3.1.5.12.(2)**

## NBC 3.1.5.12

- 3) Combustible insulation ..., is permitted in the exterior walls of a building required to be of noncombustible construction, provided the insulation is protected from adjacent space in the building, ..., by a thermal barrier consisting of
  - a) not less than 12.7 mm thick gypsum board mechanically fastened to a supporting assembly independent of the insulation,
  - b) lath and plaster, mechanically fastened to a supporting assembly independent of the insulation,
  - c) masonry,
  - d) concrete, or
  - e) any thermal barrier that meets the requirements of classification B when tested in conformance with the CAN/ULC-S124 Standard



## NBC 3.2.3.8

- 1) Except as permitted by Sentence [\(3\)](#) and in addition to the requirements of Sentences 3.2.3.7. [\(2\)](#), [\(3\)](#), [\(5\)](#) and [\(6\)](#), foamed plastic insulation used in an exterior wall of a [building](#) more than 3 [storeys](#) in [building height](#) shall be protected on its exterior surface by:
  - a) concrete or masonry not less than 25 mm thick or,
  - b) [noncombustible](#) material that complies with the criteria for testing and the conditions of acceptance stated in Sentence [\(2\)](#) when tested in conformance with CAN/ULC-S101, “Fire Endurance Tests of Building Construction and Materials.”

# SPF with thermal barrier





# Applicable Standards

# Reference Standards

In Canada, the manufacturing and installation of light and medium density spray-applied polyurethane foam insulation is governed by the following standards:

- **CAN/ULC-S705.1-15** – Standard for Thermal Insulation Spray Applied Rigid Polyurethane Foam, **Medium Density** – Material Specification
- **CAN/ULC-S705.2-05** – Standard for Thermal Insulation Spray Applied Rigid Polyurethane Foam, **Medium Density** – Application
- **CAN/ULC-S712.1-10** Standard for Thermal Insulation – **Light Density**, Open Cell Spray Applied Semi-Rigid Polyurethane Foam – Material Specification

These standards are referenced in the NBC, BCBC and VBBL.

# Future Additional Standards

In the near future (within 5 years?) the following standards will also be applied

- **CAN/ULC-S712.2**, Standard for Thermal Insulation - **Light Density**, Open Cell Spray Applied Semi-Rigid Polyurethane Foam – **Installation**.(Under development by ULC/SPF Task Group)
- **CAN/ULC-S718-13**, Site Quality Assurance Program for Spray Polyurethane Foam

These standards are **not** currently referenced in the NBC or BCBC or VBBL.

# Product Approvals





# **SPF Applications and Troubleshooting**

# Site Conditions / Substrate Preparation

- Relative Humidity
- Wind
- Temperature Difference (Between Ambient and Substrate)
- Different SPF formulations for temperature (vary by manufacturer)
- Substrate preparation
  - Wood – MC less than 19%, clean and dry
  - Concrete – cured 28 days, dry, clean/free of form oils
  - Bare Steel – remove oil and rust, clean and prime
  - Galvanized, Stainless, Aluminum, PVC – wash w/ mineral spirits, dry and prime





# Applications

# SPF for Exterior Walls



# SPF for Interior Stud Cavities



# SPF at Joist Ends



# Attic Insulation (Interior Drywall)



# SPF for Soffit Insulation (covered with thermal barrier)



# SPF under flat unvented roofs




# SPF for Crawlspace and Underslab Insulation





# SPF for Below Grade Foundations Walls





# **SPF Quality Assurance Programs (QAP)**




# Certification Organization Responsibilities

# Certification Organization Responsibilities


- Review and certify each manufacturers QAP
- Evaluate and certify that all installers have been properly trained in safety, equipment, testing, and product application
- Manage the SQAP
  - Review Daily Work Records
  - Perform Site Audits/Project Inspections
  - Perform Contractor Audits
  - Perform Warranty Reviews
  - Conflict Resolution
  - Consumer Complaints

# Quality Assurance Program



**MORRISON HERSHFIELD**

Card Number: 1234  
Status: Level 1 T  
Certified To Install:  
2lb and 1/2lb  
Date of expiration: 08-2016  
Scope of certification: Medium Density SPF, Light Density SPF



Harold Louwerse  
Notareal Company

company logo  
here



QUALITY ASSURANCE PROGRAM

This Certification Card is the property of Morrison Hershfield (MH).  
MH is mandated to verify that the manufacturer's spray polyurethane foam (SPF)  
is installed in accordance with CAN ULC S705.2-05 as well as  
the manufacturer's guidelines.

For Installer and/or Project Evaluations: 1 (800) 796-5792

[www.morrisonhershfield.com/QAP](http://www.morrisonhershfield.com/QAP)



# **Manufacturer/Supplier Responsibilities**

# Manufacturer/ Supplier Responsibilities

- Provide a product that meets S705.1 or S712.1
- Provide a training program for all contractors and their installers:
- Hire a third party Certification Organization to certify and operate their QAP
- Provide technical support
- Track product records, shipping, project logs, continual sampling and testing




# Installer/Contractor Responsibilities



# Installer/Contractor Responsibilities

- Provide a quality installation that:
  - Meets code requirements
  - Meets manufacturers requirements
  - Meets project requirements (thickness/location)
- This is done by:
  - Proper substrate preparation
  - Verification of environmental conditions
  - Adjusting equipment/controls accordingly
- This is confirmed by:
  - Quality checks of adhesion/cohesion/density/thickness

# Troubleshooting



**What could possibly go wrong with mixing chemicals on thousands of construction sites in various applications with varying substrates and environmental conditions, by hundreds of different installers?**

# What are we looking for?



# What should a SPF installation look like?



# Bulk Sampling



# Removal



# Off Ratio Foam



Lack of Resin



Lack of Iso



# Blisters



# Cracking



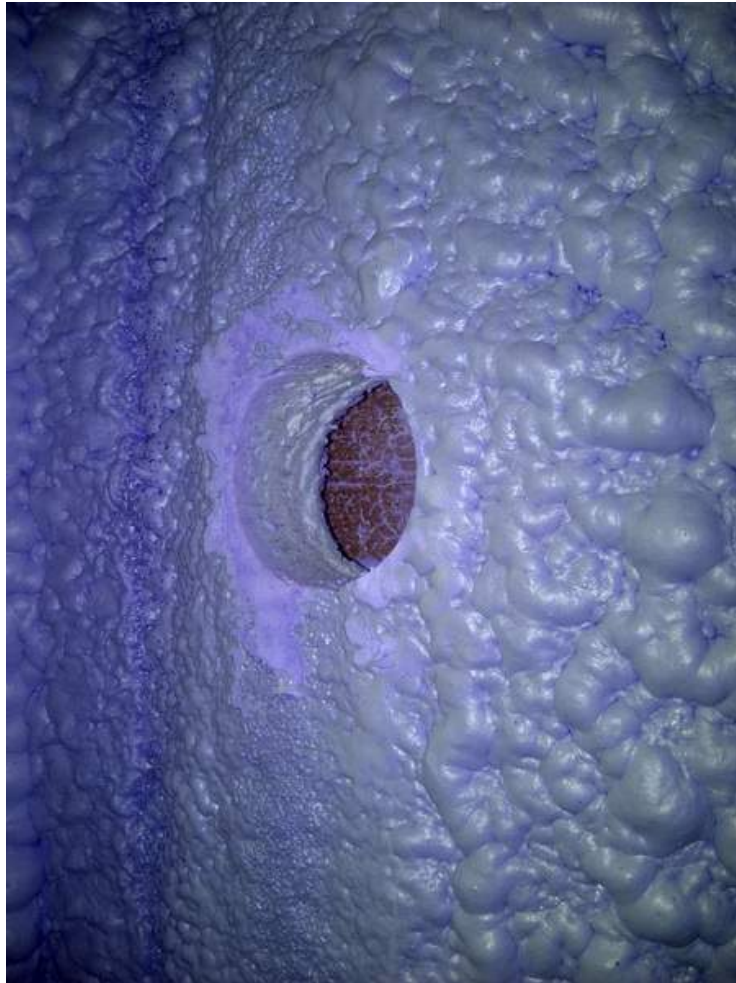
# Too Thick, Scorching



# Scorching, Low Density



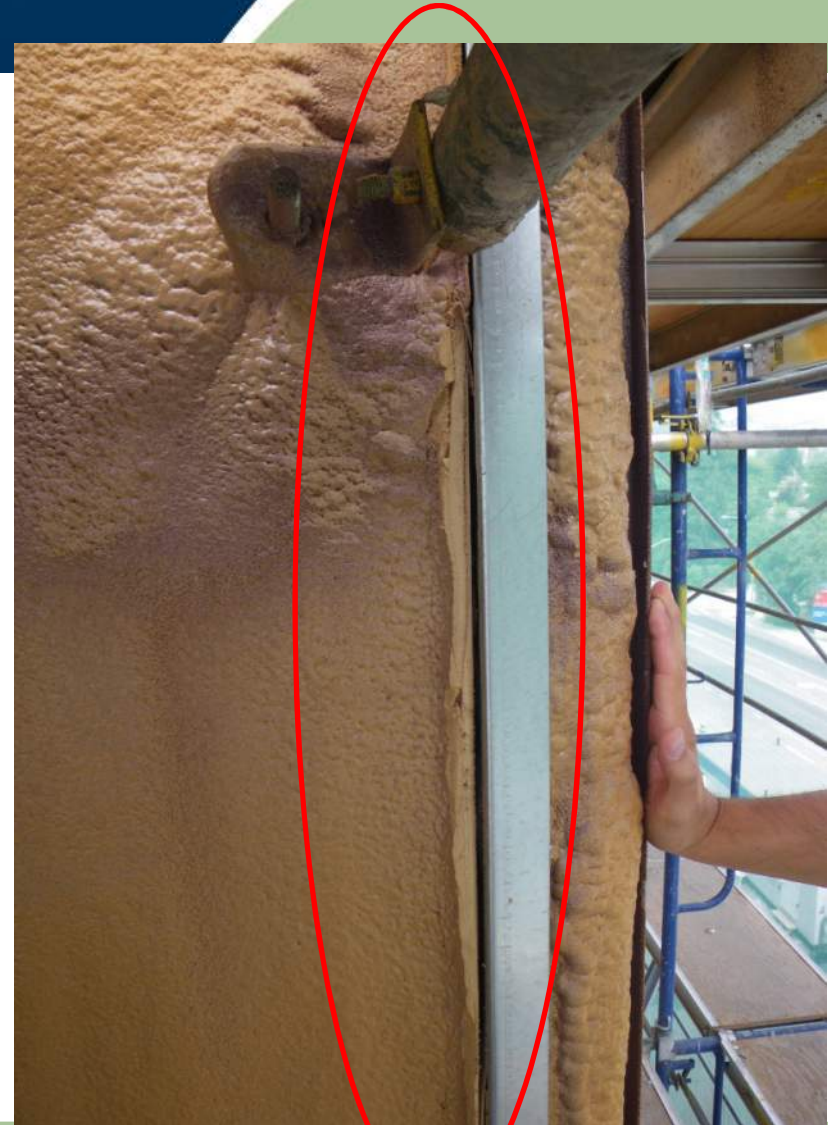
# Poor Adhesion



# Wet Substrate



# Shrink back



# Summary

- Problems do arise. When in doubt, rip it out.
- Quality is dependent on the installer, working within varying environmental conditions
- Installers undergo training by the manufacturer and undergo third party evaluation
- QAP provides assurance of compliance in accordance to the manufacturer installation standards as well as other applicable standards.
- Use the right foam for the right job.



**Thank You**

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