



# PRODUCT APPLICATION GUIDE

**CLOSED CELL SPRAY FOAM**

This guide provides important information for the application of Natural-Therm® 2.0 HFO, Natural-Therm® Pro, and Ultra-Pure® Closed Cell spray foam systems, as well as the Natural-Therm® Zero “Hybrid” partially closed cell system. These systems consist of a 1:1 volumetric blend of a polymeric isocyanate (A Component) and polyol formulation containing resins, fire retardants, surfactants, catalysts, and blowing agents (B Component). The end products are rigid, yellow to tan closed cell foams with approximate densities between 2.0–2.5 pounds per cubic feet (32–40 kg/m<sup>3</sup>) for closed cell products, and 1.6–2.0 pounds per cubic feet (26–32 kg/m<sup>3</sup>) for the hybrid product. When sprayed, the heat of reaction evaporates the physical blowing agents, causing the cells to expand as the polymerization hardens the foam structure. Understanding this is very important as yield and performance of the final foams are directly linked to temperature, sealed storage of B Component drums, as well as safety considerations as drums can become pressurized if heated. These topics will be covered in this guide.

## SAFETY/PPE

**Exposure:** Read and understand the Safety Data Sheet (SDS) for this product before use. Personnel must use appropriate respiratory, skin, and eye Personal Protective Equipment (PPE) when handling and applying polyurethane spray foam systems. For interior applications: full body protection and supplied air respirators (SAR) are required. A comprehensive review of SPF safety and handling can be found on the CPI Website.<sup>1</sup>

**Fire:** Polyurethane foam may present a fire hazard if exposed to fire or excessive heat (i.e., cutting torches). 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 prescribed by applicable building code(s). Proper authorities with jurisdiction over a particular area should always be consulted for additional or specific requirements prior to beginning any project. In addition, excessive thickness applications of product (> 4 inches) or insufficient dwell time between lifts may lead to scorching or combustion of foam. See details in section on spraying.



## TRAINING

All people who are installing this product must be trained by either Natural Polymers, LLC, an authorized distributor training program, the Spray Polyurethane Foam Alliance PCP, or an equivalent classroom and hands-on program in addition to having taken and passed the ACC CPI online SPF training course. If the customer is buying and installing this product through a secondary party, distributor, or manufacturer’s representative, the secondary party and the installer are responsible for the necessary training and certification to properly install this product.



<sup>1</sup> [www.americanchemistry.com/industry-groups/center-for-the-polyurethanes-industry-cpi/resources/library/health-and-safety-product-stewardship-workbook-for-high-pressure-application-of-spray-polyurethane-foam-spf](http://www.americanchemistry.com/industry-groups/center-for-the-polyurethanes-industry-cpi/resources/library/health-and-safety-product-stewardship-workbook-for-high-pressure-application-of-spray-polyurethane-foam-spf)

## STORAGE

Store containers between 50°F and 80°F in covered areas with no direct sunlight. It is important not to allow the materials to freeze. Containers should be opened carefully to allow any pressure buildup to be vented safely while wearing full safety protection. Excessive venting of the B Component may result in higher density foam and reduced yield. Excessive low or high temperatures may decrease shelf life.

Shelf Life: 6 months when stored in the original unopened container at 50°F–80°F.

## PROCESSING

Drum temperatures should be conditioned to 70°F–80°F before application to ensure optimal viscosity and mixing.

## SUBSTRATE PREPARATION AND COMPATIBILITY

Natural Polymers™ Closed Cell SPF products must be applied to surfaces that are clean and dry, and free of dirt, oil, solvent, grease, loose particles, frost, ice, and other foreign matter that could inhibit adhesion such as fiberglass, mineral wool, or cellulose.

SUBSTRATE	CONSIDERATIONS	PRIMING
Wood (OSB, Plywood, Lumber)	Moisture < 18%	Generally not required
Concrete (CMU, Structural, Pour-in-Place)	28-day min. cure	Generally not required unless specified*
Metal (Steel, Painted, Aluminum,* Galvanized*)	Clean of oils, dry	May be required based on testing; *Recommended for Al, Galvanized Surfaces
Plastics (PVC, CPVC)	Compatible	Not required

\* SPFA-143 – Primers for Spray Polyurethane Foam Insulation and Roofing Systems.

## ENVIRONMENTAL CONDITIONS

Before beginning SPF product application, follow these guidelines for environmental conditions.

### Recommended substrate temperatures:

Ultra-Pure® Closed Cell	Minimum 40°F, Maximum 120°F
Natural-Therm® Pro Summer	Minimum 32°F, Maximum 120°F
Natural-Therm® Pro Winter	Minimum 20°F, Maximum 77°F
Natural-Therm® 2.0 HFO IBS	Minimum 32°F, Maximum 100°F
Natural-Therm® 2.0 HFO IBW	Minimum 20°F, Maximum 77°F
Natural-Therm® Zero	Minimum 32°F, Maximum 100°F

*Note: For dense materials like concrete, steel, etc., add 10°F to minimum temperatures.*

Moisture in the form of rain, dew, and frost can seriously affect the quality and adhesion of the closed cell SPF products to the substrate or itself. Natural Polymers does not recommend the spraying of this system when the relative humidity (RH) exceeds 85% or when temperatures are less than 5°F above dew point. When heating the interior of a building, the relative humidity can change dramatically and should be constantly monitored to ensure proper application.

For outdoor or open structure application – Wind speeds should be less than 10 mph unless wind screens are used.

## VENTILATION

During SPF application, a minimum of 10 ACH is recommended and maintained for at least 3 hours post spraying for re-entry and 24 hours for re-occupancy. Cross ventilation is required with negative pressure in the spray area and exhaust to a secured empty area ([www.owenscorning.com/naturalpolymers](http://www.owenscorning.com/naturalpolymers)). For more detailed information, please visit the American Chemistry website.<sup>2</sup>

<sup>2</sup> [www.americanchemistry.com/industry-groups/spray-foam-coalition-sfc/resources/ventilation-considerations-for-spray-polyurethane-foam-guidance-on-ventilation-during-installation-of-interior-applications-of-high-pressure-spray](http://www.americanchemistry.com/industry-groups/spray-foam-coalition-sfc/resources/ventilation-considerations-for-spray-polyurethane-foam-guidance-on-ventilation-during-installation-of-interior-applications-of-high-pressure-spray)



## REENTRY AND REOCCUPANCY

The standard recommendation for re-entry time of unprotected trade workers or re-occupancy time of building occupants is 24 hours. Based on the level of ventilation, reduced times may be possible. Please refer to individual product technical data sheets for more information. If SPF was applied with a minimum of 10 ACH, cross ventilation during and 3 hours post spraying, re-entry of trade workers to adjacent areas may be permitted.

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## CHEMICAL PREPARATION

Proper mixing of the A Component and B Component in the spray gun is essential for quality spray foam product application. Efficient transfer of components from the drums to the proportioner and mixing at the gun are viscosity dependent. Maintaining the temperature of both components between 70°F and 80°F will ensure adequate viscosity and performance is achieved.

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## PROCESSING INSTRUCTIONS

The proportioning equipment must be manufactured specifically for heating, mixing, and spray application of polyurethane foam, and be able to maintain 1:1 metering with a +/- 2% variance and adequate main heating capacity to deliver heated and pressurized materials up to 150°F.

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## TRANSFER PUMPS

1:1 or 2:1 double acting transfer pumps should be used to deliver both A and B sides to the proportioner. To avoid possible frothing, diaphragm pumps and wall-mounted/drum-mounted pumps should not be used to process Natural Polymers closed cell spray foam B Components.

## PROCESSING GUIDANCE

	Natural-Therm® 2.0 HFO Winter / Natural-Therm® Pro Winter	Natural-Therm® 2.0 HFO Summer / Natural-Therm® Pro Summer	Ultra-Pure® Closed Cell, Natural-Therm® Zero
Ambient Temperature	20°F–77°F	32°F–100°F / 32°F–120°F	50°F–100°F

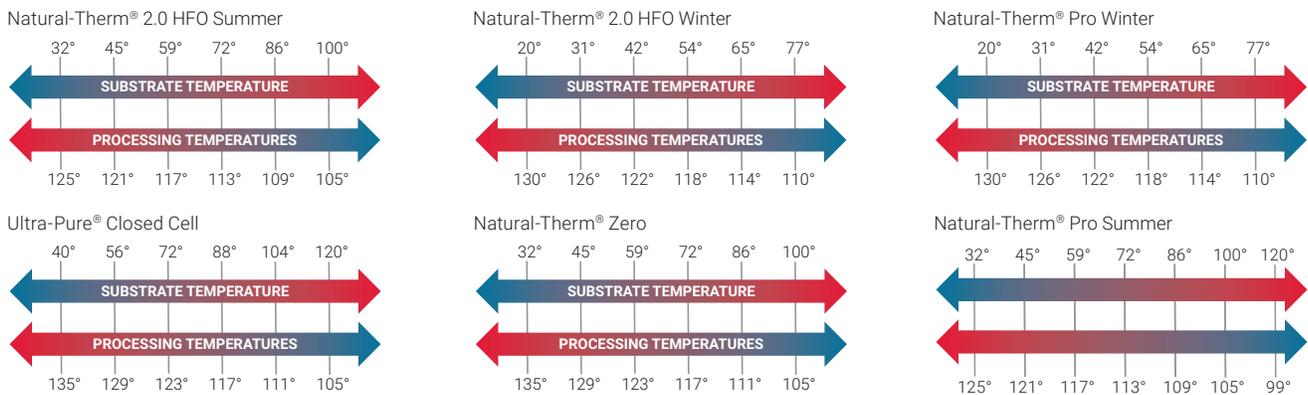
### MACHINE SETTING TEMPERATURE

A Component Pre-heaters <sup>1</sup>	110°F–130°F	105°F–125°F	105°F–135°F
B Component Pre-heaters	110°F–130°F	105°F–125°F	105°F–135°F
Hoses	110°F–130°F	105°F–125°F	105°F–135°F
Spray Pressure (Dynamic) <sup>2</sup>	1,100–1,500 / 1,200–1,600 psi	1,100–1,500 / 1,200–1,600 psi	1,100–1,500 psi

### PROCESSING CHARACTERISTICS

Cream Time	0.5–2 (Seconds)	1–2 (Seconds)	0.5–2 (Seconds)
Tack-Free Time	4–5 (Seconds)	6–7 (Seconds)	5–6 (Seconds)
Initial Cure Time	<1 Hour <sup>3</sup>	<1 Hour <sup>3</sup>	<1 Hour <sup>3</sup>

<sup>1</sup> The following chart provides guidance for initial proportioner and drum temperatures based on ambient conditions.



<sup>2</sup> Follow equipment manufacturer's recommendations for maximum hose lengths and additional heating. Extended hose lengths and/or elevation above proportioner can reduce pressure at spray gun.

<sup>3</sup> Complete cure will depend on temperature, humidity, and degree of ventilation. Complete cure usually occurs within 24–72 hours.

## SPRAYING

Natural Polymers closed cell SPF products are designed to provide optimal yield when sprayed in 2- to 4-inch-thick passes. Spray foam generates significant heat when curing, with resulting temperatures up to 350°F at the specified thicknesses. Excessive pass thickness above 4 inches can reduce physical properties and cause local overheating and possible fire. Additional thickness may be applied when the surface temperature of the foam is less than 100°F. Yield and in-place density are dependent upon the temperature of the substrate, ambient air temperature, gun speed of application, gun tip size, and the output of the proportioner.

In the event excessive pass thickness is applied, immediately remove those areas from the substrate using a tool such as a prybar. Do not use unprotected hands as the foam can be very hot and cause burns. After removal from the building, break up large pieces of foam on a non-flammable surface using the non-flammable tool. Large masses of SPF should be removed to an outside safe area, cut into smaller pieces, and allowed to cool before discarding into an appropriate trash receptacle.

In freezing conditions, the substrate temperature must be consistently maintained above 20°F for Winter Series, 32°F for Summer Series and Natural-Therm® Zero, and 40°F for Ultra-Pure® Closed Cell to ensure proper curing. In addition, for exceptionally dense materials like concrete, metal, etc., increase these minimum temperatures by at least 10 degrees.



## EXPOSED FOAM

Keep closed cell SPF away from direct contact with sunlight. Ultraviolet (UV) light will break down the urethane bonds, causing discoloration and turning the material dark yellow to brown. Over time, the material will become friable and flakey. Also, because spray foam is combustible, it is required by building codes to be covered for fire protection in most applications. Specific guidance about thermal or ignition barrier requirements can be found in the corresponding evaluation reports for each product.

Natural-Therm® Zero	IAPMO ER-527
Natural-Therm® 2.0 HFO	IAPMO ER-714
Natural-Therm® Pro	IAPMO ER-1005
Ultra-Pure® Closed Cell	IAPMO ER-800

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## FLUSHING AND CHANGEOVER

During changeover between different spray foam products, it is very important to prevent cross contamination of components. For Natural Polymers spray foam systems, the A-side is generally the same; however, the B-side components can be very different, especially between open and closed cell products. When switching from one system to another, care should be taken to wipe off the transfer pumps prior to inserting them into the new material. Product remaining in lines and equipment should be purged, captured for reuse, or disposed of properly before introducing new material. Expect 1 gallon of material to be purged per 100 feet of hose. After flushing and transitioning to new material, make sure to spray out sufficient product to verify stable spray and reactivity behavior before beginning application.



## DISPOSAL

### Empty Containers

Empty Natural Polymers closed cell SPF product containers are not considered hazardous waste under current Resource Conservation and Recovery Act (RCRA) regulations. When properly prepared, they are considered safe for landfill disposal or preferably recycled at a drum reconditioning facility (visit [www.reusablepackaging.org](http://www.reusablepackaging.org) for nearby options). Disposal of unused product (drums or bulk) must be done in compliance with all applicable Federal, State, County, or Municipal regulations and guidelines.

### Emergency Handling

As noted in previous section, Natural Polymers closed cell SPF product chemicals are safe while being stored or transported in containers that have remained closed and intact. Special procedures do, however, need to be followed in the event of fire, leaks, spills of chemicals, or pressurization of containers. In the event of an emergency, information and advice may be obtained by calling CHEMTREC at 1-800-CHEMTREC any time of day or night.

### Personal Protective Equipment to Be Worn in the Event of Spills or Leaks

Should a spill or leak occur with A-component or B-component, follow the guidelines in section 8 of the corresponding SDS for detailed guidance on appropriate levels of PPE, including eye/face, skin, and respiratory protection. If the potential exposure limits are unclear, default to the maximum eye/face, skin, and respiratory protection. Consult specific product Safety Data Sheets (SDS) for reference.



#### **Disclaimer of Warranties and Limitation of Liability**

Natural Polymers warrants only that the products shall be manufactured in accordance with Natural Polymers' published specifications. Natural Polymers disclaims all other warranties, whether express or implied, including the implied warranties of merchantability, fitness for a particular purpose, and non-infringement of any intellectual property rights, all of which are expressly excluded. To the fullest extent permitted under applicable law, Natural Polymers shall not be liable for incidental, consequential (including any lost profits) or special damages, punitive damages, or for damage to the building, its contents, or its occupants. Natural Polymers' total liability and the exclusive remedy for all proven claims is replacement of the nonconforming product, and in no event shall Natural Polymers be liable for any other damages.

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