



## PRODUCT APPLICATION GUIDE

Additional product information can be found on the Demilec website at [www.Demilec.com](http://www.Demilec.com). Refer to the following documents plus this Product Application Guide to establish processing parameters for varying substrate and climatic conditions:

- Center for Polyurethane Industries, Guidance on Best Practices for the Installation of Spray Polyurethane Foam
- Barnseal MD & Barnseal HD Technical Data Sheets
- Barnseal MD & Barnseal HD B-side SDS's
- A-PMDI SDS

### GENERAL PROCESSING GUIDELINE

Barnseal® requires heat from the proportioner to complete the chemical reactions necessary to create foam meeting the specifications on the Technical Data Sheet. Fully functional primary heaters and hose heat are needed to process Barnseal. Please consult the Demilec Technical Service Department for further assistance.

### CHEMICAL CONDITIONING

The chemical drums should be stored and maintained between 50°F (10°C) and 85°F (29°C) before processing at the job site. If the drums are bulged due to excessive heat, do not open the drums. Cool the drums for approximately 24 - 48 hours to allow the reacted blowing agent, 245fa, to return to a liquid state. Other means of cooling the drums on site may be necessary, contact the Demilec Technical Service Department for more information.

### SUBSTRATE PREPARATION

All surfaces to be sprayed must be free of oil, grease, waxes, rust scale, loose dirt and water. In addition, the substrate must be structurally sound. The moisture content of wood substrates must not exceed 19% before foam is applied. Some metal surfaces may require sandblasting and priming prior to foam spraying to ensure adequate adhesion. Consult a Demilec Technical Service Representative for additional information on surface preparation. When in doubt about the potential for adhesion to a substrate, build a mock-up and spray the foam under similar conditions to that expected in the field, then test for adhesion and cohesion.

#### Applying foam insulation to concrete:

- Concrete and masonry must be fully cured and "bone-dry."
- Oils - wash with detergent and allow to dry
- Salt or calcium deposits - wash with detergent and allow to dry
- Muriatic acid can be an effective cleaning agent for preparing concrete substrates prior to spraying foam. Follow the label instructions for dilution and application.

#### Applying foam insulation to galvanized steel:

- Oils or passivators - clean with solvent, wash with water based cleaner/degreaser, brush blasting may be necessary.
- Do not use hydrocarbon solvents like mineral spirits to clean galvanized metal.
- White rust - wire brushing or scrubbing with a stiff brush or abrasive pad.
- Prime using a DTM (direct to metal) bonding primer suitable for galvanized metal.

#### Applying foam over previously painted surface:

- Glossy surfaces - sand or abrade surfaces.

#### Applying foam over bare steel/metal:

- Rust scales - wire brushing or scrubbing with a stiff brush or abrasive pad.
- Corrosion - clean then prime with suitable bonding primer.
- Glossy or very smooth surfaces - sand or abrade surfaces.

#### Applying foam over stainless steel:

- Oils - wash with mineral spirits and then prime with a suitable primer. Brush blasting, sanding or abrading may be necessary as foam requires a mechanical bond.

#### Applying foam over aluminum:

- Oils, Hydrated Alumina - clean with solvent, never use a caustic solution, and prime with a high adhesion bonding primer suitable for aluminum.

#### Applying foam over glass:

- Oils - wash with detergent
- Glossy or very smooth surfaces - sand or abrade surfaces.
- UV degradation - prime glass surface with suitable primer.

#### Asphalt and Tar:

- Solvents - allow to cure and for solvent to evaporate, prime with suitable primer.

#### Rigid Polyurethane Foam:

- UV degradation - remove surface of foam with wire brush or wire grinding wheel.

#### Polypropylene, polyethylene, some silicones and some ceramic surfaces:

- Barnseal may not adhere without a mechanical attachment to these substrates.

**APPLICATION PARAMETERS**

**EQUIPMENT** – Follow the spray equipment manufacturer’s safe operation guidelines. Every spray unit is slightly different and you will need to adjust your primary heater and hose temperatures accordingly for each polyurethane foam system. Adjust your processing pressures and application technique for an appropriate spray pattern for the substrate and structure.

**PROPORTIONER** – Use only fixed ratio (one-to-one), volumetric positive displacement pumps connected to a common drive.

**TRANSFER PUMPS** – Use 2:1 or 1:1 double acting transfer pumps assuring equal pressure is delivered from both sides to the proportioner. Diaphragm pumps, wall mounted or drum mounted pumps should not be used to process 2 lb foams containing the blowing agent 245fa. Contact the Demilec Technical Service Department for recommendations.

**PRIMARY HEATERS** – The primary heaters should be resistance controlled, direct contact heating rods, either submersible, mass block and tube style or combination of direct heating contact rods and mass block (hybrid heater). The primary heaters should be controlled through independent controllers, separated from the hose heat to ensure an accurate setpoint temperature. Barnseal may not be consistently sprayed in conformance with the written specification if the combination of the proportioner’s pumping capacity, the primary heat capability and spray gun discharge rate (mixing chamber size) is out of balance. Contact the Demilec Technical Service Department for further guidance.

**HEATED HOSE** – Demilec recommends the use of heated spray hoses rated at ≥ 2000 psi. Use moisture resistant hoses specifically designed for isocyanate. The heated spray hose should be able to maintain temperatures up to 190°F (88°C) and should be heated using an electrical element with an independent temperature sensor. The heated hose should also be adjusted and monitored separately from the A and B primary heaters, and should be capable of maintaining the temperature from the A and B primary heaters all the way to the spray gun.

**FLUSHING/CHANGING FROM ANOTHER CHEMICAL TO BARNSEAL**

Follow the published flushing procedure on the Demilec website. Never flush water through the A-side (iso side). Failure to properly flush will result in off-spec foam and does not qualify for the Demilec Limited Lifetime Warranty.

**FOAM APPLICATION**

In preparation for spraying, an off-target test spray should be performed to verify the processing pressure, primary heater and hose temperature settings. The “initial setpoint temperatures” listed below and on the Technical Data Sheet are suggested general starting parameters; it’s important to observe the foam and the reaction time of the reacting mass and make additional adjustments throughout the day as needed to maintain proper cell structure, adhesion, cohesion and general foam quality.

RECOMMENDED PROCESSING CONDITIONS*				
	BARNSEAL MD		BARNSEAL HD	
Initial Primary Heater Setpoint Temperature	Regular 108 – 112°F Winter 100 – 120°F	Regular 42 – 44°C Winter 38 – 49°C	125°F	52°C
Initial Hose Heat Setpoint Temperature	Regular 108 – 112°F Winter 100 – 120°F	Regular 42 – 44°C Winter 38 – 49°C	125°F	52°C
Initial Processing Setpoint Pressure	Regular 700 psi Winter 800 psi	Regular 4827 kPa Winter 5516 kPa	1000 psi	6895 kPa
Substrate & Ambient Temperature	Regular > 41°F Winter 14 – 59°F	Regular > 5°C Winter -10 – 15°C	> 50°F	> 10°C

\*Foam application temperatures and pressures can vary widely depending on temperature, humidity, elevation, substrate, equipment and other factors. While processing, the applicator must continuously observe the characteristics of the sprayed foam and adjust processing temperatures and pressures to maintain proper cell structure, adhesion, cohesion and general foam quality. It is the sole responsibility of the applicator to process and apply Barnseal within specification.

One proven method of applying Barnseal is to spray perpendicular (90 degree angle) to the substrate, holding the gun 18 – 24” away from the substrate. This technique also helps minimize over spray. Barnseal should be applied by spraying vertically or horizontally to the substrate while overlapping the passes 60 – 80%. Apply by spraying into the gelling material (wet line) as it is rising. If the processing parameters are set too high, the pattern may be uncontrollable, the mixing chamber may clog often, the wet line will not be as pronounced and the surface characteristics will be rough. When the parameters are too low the foam may spray in a direct stream and remain un-reacted for several seconds.

Always spray perpendicular to the surface in 1” to 2” lifts. Maximum thickness per pass is 2” (51mm). Spraying sections too thick, too fast may result in charring of the foam, or in extreme conditions a fire may result. Thin foam layers often result in poor physical properties, reduced coverage and poor chemical reaction due to low exothermic heat generated from the chemical reaction, which is needed to create proper closed cell formation.

If touch-ups or subsequent passes are needed to achieve the prescribed thickness, allow the foam lifts to cool. When multiple passes are needed to achieve the prescribed thickness, allow the foam to cool before proceeding with the next pass. It is recommended to use a 0 – 220°F pocket sized, self penetrating thermometer to ensure that the foam has cooled before additional layers can be applied. Wait until the core of each pass has cooled to 100°F (38°C) or below before successive foam lifts are applied. When multiple layers are necessary to achieve the proper R-value, cross-hatching should be done. This technique aids in proper cohesion of passes.

The temperature of the substrate has a major effect on the foam density and adhesion. Certain compromises are necessary to spray in cold weather. The “COLD WEATHER PROCESSING” section offers more information on this topic. If in doubt about the substrate or the ambient conditions, a trial application should be done to check foam quality and spray performance. Water on the substrate from rain, fog, condensation, etc. will react chemically with the isocyanate, adversely affecting the physical properties, performance and adhesion of the foam. Barnseal should never be applied when the relative humidity is above 80%, as high relative humidity can adversely affect the physical properties of the foam.

## EXTERIOR FOAM APPLICATION

Climatic conditions are an important factor that should be considered when preparing to apply foam to the exterior of a structure. Ambient and substrate temperatures should be monitored. Foam should only be applied when ambient and substrate temperatures are inside the range for the foam system being used. Foam should only be applied to substrates with less than 19% moisture content. It is best to apply foam when the humidity is less than 80% and the wind is less than 10 mph to maintain proper adhesion. Pay close attention to the temperature of the substrate when applying foam to the exterior of a structure.

Use windscreens downwind, the foam can travel long distances because the particles may separate when airborne. Windscreens can also be configured around scaffolding and man-lifts. It may also be necessary to enclose and preheat the area to the acceptable temperature range for the foam system being used. In preparation for spraying, a test spray should be performed to ensure that the proper processing temperatures and pressures are set. The specified settings per the TDS are general starting parameters, it is important to observe the foam and the reaction time of the reacting mass and make additional adjustments as needed.

When applying foam to the substrate, each pass should not be less than 1" in thickness because of the possibility of reduced foaming. Each pass should not exceed 2" thick to avoid elongated cell formation and to minimize stress cracking which can lead to scorching and fire. When multiple passes are needed to achieve the prescribed thickness, allow the foam to cool before proceeding with the next pass. It is recommended to use a 0 - 220°F pocket sized, self penetrating thermometer to ensure that the foam has cooled before additional layers can be applied. Wait until the core of each pass has cooled to 100°F (38°C) or below before successive foam lifts are applied. Successive passes should overlap 60 - 80% to ensure a smooth surface free of ridges. The thickness of the insulation should be measured with a depth gauge. A final pass should be applied to cover the holes made by the depth gauge and thermometer.

## HOW TO AVOID OVER SPRAY

Over spray with closed cell foams occurs for a variety of reasons such as spraying the product too cool, applying the product to a substrate that is too cold, not spraying perpendicular to the surface, and high wind conditions. Flash coating to warm the surface is not a recommended practice and may create unwanted over spray. Flash coats are very thin and may not have enough exothermic reaction present to properly cure. Excessive over spray may lead to blisters or delaminating of additional passes of foam or coating. Over spray can travel long distances and may adhere to objects left unprotected such as windows, buildings and automobiles. Protect anything that should not get foamed.

## LIMITATIONS OF USE

Barnseal is a combustible material with a maximum continuous service temperature of 180°F (82°C). Barnseal should not be used in direct contact with chimneys, flues, steam pipes, recessed lighting or heat emitting devices. Consult the listing or label of such materials for clearance to combustibles. A minimum clearance of 3" should be maintained when applying around recessed lighting, and it's important to avoid spraying inside electric outlets or junction boxes. Properly prep and secure any material or surface that should not get insulated. If in doubt about the substrate temperature or surface conditions, a trial application should be conducted to check foam quality and spray performance. Water on the surface from rain, fog, condensation, etc. will react chemically with the isocyanate, adversely affecting the foam and physical properties, particularly adhesion.

## COLD WEATHER PROCESSING

The minimum substrate and ambient temperature for Barnseal is 50°F (10°C). Low temperatures affect the foaming process in two ways.

1. Chemical reactions can be slowed due to reduced exothermic energy within the expanding mass, which could lead to poor cell structure, dripping and voids from slow plastic formation
2. This reduced temperature often leads to reduced yield.

The temperature and type of substrate has a greater influence on the quality of the foam than the temperature of the air because the rate of heat transfer from liquid to air is much slower than the rate from liquid to substrate. If the substrate temperature is too low, or it is a highly conductive material such as metal or concrete, the heat produced by the chemical reaction may be drawn into the substrate so rapidly that plastic formation and cell generation becomes very slow, thus reducing yield. It is not a good practice to use the heated chemicals to warm the surface (flash coat). Instead, if the substrate to be sprayed is too cold to produce proper foam, the substrate should be heated using an indirect-fired heater or the foam should be sprayed on a warmer substrate on a warmer day. No open flame or direct heating is permitted during the spraying process.

## VENTILATION

Ventilate during spray foam application and for a minimum of 24 hours following the application.

## CHEMICAL STORAGE

Barnseal B-side resin is packaged in totes or in closed-head metal drums. A-PMDI is packaged in totes or in closed-head metal drums. Store the B-side resin at temperatures between 50°F (10°C) and 85°F (29°C). Store the A-side isocyanate at temperatures between 50°F (10°C) and 100°F (38°C). Keep away from direct sunlight. Remove the transfer pump and tightly close the bungs of the A-PMDI and B-side drum after use. Barnseal B-side resin has a 6 month shelf life when stored within the acceptable storage temperatures and the drum is in its original condition with the bungs having never been removed. See Barnseal MD & Barnseal HD B-side SDS for additional product information.

## LIMITATIONS

This product is intended for agricultural applications and is not for use in residential or commercial buildings. This product must not be used when the continuous service temperature of the substrate or foam is below -60°F (-51°C) or above 180°F (82°C). Barnseal must be protected from direct exposure to sunlight; incidental exposure during construction may cause surface discoloration but will not degrade the performance of the foam.

## FOR MORE INFORMATION

Visit [www.Demilec.com](http://www.Demilec.com) or call 1-877-DEMILEC (336-4532) for more information on health, safety and environmental protection with respect to polyurethane chemicals.

**Disclaimer:** The information herein is to assist customers in determining whether our products are suitable for their applications. We request that customers inspect and test our products before use and satisfy themselves as to contents and suitability. Nothing herein shall constitute a warranty, expressed or implied, including any warranty of merchantability or fitness, nor is protection from any law or patent inferred. All patent rights are reserved. The foam product is combustible and must be protected in accordance with applicable codes. Protect from direct flame and spark contact, around hot work for example. The exclusive remedy for all proven claims is replacement of our materials.