Building Envelope Solutions, Inc.

Identifying solutions for better building performance

The SUPERGREEN III FOAM™ SPRAY SYSTEM is a proprietary Trade Name product manufactured solely for Building Envelope Solutions, Inc., FOAM-TECH Division.

PRODUCT DATA SHEET

SUPERGREEN III™ is a technologically advanced HFC-245fa sprayable polyurethane foam for wall and roof systems.

TYPICAL PHYSICAL PROPERTIES[1]

	ASTM Method	RT 2045-1.8	RT 2045-2.5
Nominal Density	D 1622	1.8 pcf	2.5 pcf
Compressive Strength	D 1621	22 psi	25 psi
Tensile Strength	D 1623	40 psi	50 psi
Shear Strength	C 273	35 psi	45 psi
Closed Cell Content (min.)	D 1940	93%	93%
R-value (initial)[2]	C 518	7.48	7.48
R-value (aged)	C 518	6.45	6.45
Water Absorption (gm/cc)	D 2842	0.025	0.020
Water Vapor Transmission@21/2"	E96-00	0.94	0.94
Dimensional Stability	D 2126		
158°F/100% RH			
Δ V 1 Days		5 %	
Δ V 7 Days		7 %	
Δ V 28 Days		10 %	
-10°F/Ambient RH		±1%	

[1] This information is intended only as a guide for design purposes. The values shown are the average values obtained from sprayed laboratory samples. The test methods were performed per the ASTM Book of Standards.

[2] R-value varies depending on age and use conditions.

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NOTE: These products are intended for commercial, industrial, and residential projects and should be applied by a licensed insulation contractor who has been specifically trained in the application of polyurethane foam products.

LIQUID COMPONENT PROPERTIES

Viscosity/Specific Gravity at 70°F	**RT-2045 - 1.8**	**RT-2045 – 2.5**
Component A (cps)	200/124	200/124
Component B (cps)	700 ± 200cps/1.24	800 ± 200cps/1.24
Mixing Ratio by Volume		
Component A (CPS)	50	50
Component B (CPS)	50	50

PROCESSING CHARACTERISTICS AND RECOMMENDATIONS

RECOMMENDED PROCESSING TEMPERATURES	**Preheater**	**Hose**
Component A	100-115°F	110-130°F
Component B	130-135°F	110-130°F

These temperatures are typical of those required to produce acceptable product using conventional Gusmer or Grace equipment. Environmental conditions may dictate the use of other temperature ranges. However, under no circumstances should a temperature of 140°F be exceeded. It is the responsibility of the applicator to determine the specific temperature settings to match the environmental conditions and his own equipment.

PROCESSING CHARACTERISTICS

Machine Mix at recommended temperatures*	**Winter**	**Regular**
Cream Time	1 second	2 seconds
Tack Free Time	On Rise	On Rise
Cure Time	4 Hours	4 Hours

New generation spray foams incorporating 245fa materials will require additional heat capacity to efficiently spray. Older equipment may be upgraded with “Artic Booster Pack” heaters or minimum H-2000 proportioners are required to adequately pre-heat the components. Spray guns such as; D-gun, Gap-gun, GX7-gun, Fusion gun, and Probler guns fitted with smaller output tips (15-18 lbs/min) for

better spray control from stud wall applications at recommended processing temperatures are recommended.

RECOMMENDED SUBSTRATE TEMPERATURES

At time of application	RT2045 Winter	RT2045 Regular
Minimum	40°F	60°F
Maximum	80°F	120°F

For applications below 40°F, FOAM-TECH personnel should be consulted. At the lower end of the indicated temperature ranges, flash passes should be avoided.

SHELF LIFE

When stored in the original unopened container at 50°F-75°F, the shelf life of the components is six months. Temperature above 75°F decreases the shelf life.

FLAMMABILITY CHARACTERISTICS*

SURFACE BURNING CHARACTERISTICS

ASTM E-84*	3"	4"
Flame Spread*	25	25
Smoke	400	400

Sample spray applied at 1/4" Cement Asbestos Board.

*Note: This numerical flame spread and all other data presented is not intended to reflect the hazards presented by this or any other material under actual fire conditions.

CAUTION: Polyurethane foam produced from these materials may present a fire hazard if exposed to fire or excessive heat (i.e. cutting torches). The use of polyurethane foam in interior applications on walls and ceilings presents an unreasonable fire risk unless protected by an approved fire resistant barrier with a finish rating of not less than 15 minutes. A code definition of an approved “thermal barrier” is a material equal in fire resistance to ½” gypsum board. Each firm, person, or corporation engaged in the use, manufacture, production or application of polyurethane foams products from these resins should carefully examine his end use to determine potential fire hazard associated with such product in a specific use and to utilize appropriate precautionary and safety measures. Consultation with building code officials and insurance agency personnel before application is recommended.

FREIGHT CLASSIFICATION

A Component- Resin Compounds Item 46030, Class 55, NOIBN Non-Hazardous
B Component- Resin Compounds Item 46030, Class 55, NOIBN Non-Hazardous

SAFETY, HEALTH, AND TOXICITY INFORMAITON

The material safety data sheet on this product is available from FOAM-TECH upon request. Users of this product should read and understand the MSDS before use.

Protective equipment
Spraying of polyurethane foam results in the atomizing of the components to fine mist. Inhalation and exposure to the atomized particles should be minimized. The following protective equipment is recommended:

1. Fresh air full face mask or hood with fresh air source.
2. Fabric overalls
3. Fabric gloves

Physical Examination of Personnel
All personnel to be employed in the spraying of these materials should have a complete physical examination prior to starting spray operations. Periodic checkups are recommended if the personnel continue to spray these materials. Personnel with the following conditions should avoid the spraying of these components:

1. Asthma or Chronic bronchitis
2. Chronic respiratory disorders
3. Sensitization to chemical substance including polymeric isocynates.

Outdoor Application Procedures
The area surrounding the spray operation should be protected from overspray and exposure of individuals not involved in the spray operations as follows:

1. Post warning signs a minimum of 100 feet from all work areas.
2. Close all air intake vents on air handling equipment in the building.
3. Limit spectators to a minimum.
4. No welding, smoking or open flame.

Indoor Application Precautions
Indoor applications are generally more hazardous than outdoor applications. All personnel in the spray area must be equipped with a fresh air supply mask or hood. Additional precautions include:

1. Seal off the work area from adjacent rooms and ventilation ducts.
2. Restrict access of non-application personnel.

3. No welding, smoking or open flame.

Dermal Exposure
If a major splash or spill of the isocyanate component comes in contact with the skin, the affected area should immediately be washed with copious amounts of water from a safety shower or other water source. Contaminated clothing should be removed and the skin wiped with a clean dry cloth to remove the residual isocyanate. The affected area should then be wiped with a 70% solution of rubbing alcohol (isopropanol) followed by repeated washing with soap and water. If a rash develops, a physician should be consulted immediately.

Eye exposure
Splashes of either component into the eyes should be flushed immediately with copious amounts of water fro at least 15 minutes. **Consult trained medical personnel immediately.**

Inhalation
Symptoms of vapor inhalation are characterized by coughing, tightness in the chest, and shortness of breath. Excessive exposure can produce serious, possibility irreversible lung damage. Smoking in the area of application increases the risk of pulmonary injury and must be prohibited. High concentrations of isocynate may cause symptoms and problems to appear immediately. However, chronic exposure may also lead to the same symptoms and problems. **If breathing has stopped, artificial respiration must be promptly applied.** If breathing is short, oxygen (if available) should be administered by a trained medical personnel. **Obtain medical attention immediately.**

Clean up
Non-flammable solvents should be used for clean up. Consult your solvent manufacturer for handling precautions.

Incompatible Materials
The isocyanate component (A component) is incompatible with strong bases, tertiary amines or water. These materials may cause rapid, spontaneous polymerization with subsequent generation of heat and gas.

Decontamination of Spills
In the event of a major isocyanate spill, the area should be immediately evacuated. Only personnel equipped with appropriate respiratory and eye equipment should remain. If the spill occurs indoors, the area should be ventilated and leaking containers should be taken outdoors and the remaining isocyanate transferred to other containers.

The spill should be covered with sawdust; Ekoperl, vermiculite, fullers earth or other oil-absorbed material should be treated with a dilute solution of ammonium hydroxide/detergent. The neutralized material should be swept up and placed in a suitable container. The material should then be disposed

of by a standard method consistent with good industrial practice and accordance with environmental protection regulations in your area. Where permissible, sanitary landfill disposal is recommended.

PROCESSING AND APPLICATION GUIDE

Description
This system is a sprayable closed cell rigid polyurethane foam system designed to insulate residential stud walls, ceilings, and sub-floor areas. Controlled Atmosphere (CA) produce storage buildings, metal buildings, commercial cold store, and freezer warehouses. The sprayed product results in a seamless, monolithic, and durable insulation system. Air leakage throughout the structure is sealed eliminating costly air flow where conventional insulation materials fail. Adhesion to most clean and dry building components provides an air tight seal, and in some installations will function as a vapor barrier.

The SUPERGREEN III^{TM} FOAM Spray System is technologically advanced, consists of sophisticated materials, and should only be applied by qualified, experienced spray applicators.

Substrate Preparation
For Optimum results, surfaces to receive foam insulation should be clean and dry, free of dirt, oil, solvent, grease, loose particulates, and other foreign matter.

Plywood, OSB, and Structural Lumber (studs and joists): substrates shall be dry and free from contaminants, moisture, frost, and shall not have a moisture content above 15%. Generally primers for these surfaces are not required. Heating of these surfaces during winter conditions may increase adhesion.

Concrete Block and Poured in Place Concrete: Concrete must have a minimum 28-day cure and a moisture content below 15% to apply foam insulation. Residential footings, stemwalls, and basements generally do not require priming. Commercial CA structures, cold storage, and freezer buildings do require an appropriate primer to insure adequate adhesion where curing agents may have been used. Generally a two-component epoxy primer designed to seal and provide adhesion to concrete surfaces such as RTC Urebond V is recommended.

Painted Steel, Galvanized Steel, and Aluminum Panels: Check metal panels for surface oil used in the manufacturing process. This oil must be washed off and the surface clean and dry before priming or foaming. All aluminum and galvanized panels must be primed using a wash primer such as Cardinal 4860-420 (323-283-9335) or Sherwin Williams DTM Wash Primer. Washed and dry painted steel panel may not require priming. If a primer is required RTC-Acryprime – Substrate may be used. Metal panels are susceptible to condensate moisture forming on the ceilings, thus these surfaces must be checked prior to priming or foam insulation application.

Substrate Temperature
SUPERGREEN III™ is formulated in two different reactivity profiles to meet varying substrate temperatures jobsite. It may be a requirement to provide supplemental heating when temperatures reach 40°F and below. Depending on relative humidity these products may be applied down to 20°F when adding heat.
CAUTION: In freezing conditions when adding heat to the spray area it may be a requirement to maintain an elevated temperature during the foam insulations cure cycle so extreme temperature drops to the "green" foam are not experienced which could cause shrinking or cracking. **When using fuel fired heating units the exhaust must be vented directly outdoors to prevent unsafe carbon monoxide conditions in the work area.** Electric heating units are recommended. All heaters must be turned off before the application of foam begins. FOAM-TECH personnel should be consulted in all cases where application conditions are marginal.
On substrates where the moisture content cannot be determined, a suitable primer is recommended. Adhesion spray tests may be performed with insulating foam and the interface line checked upon cure for good cell structure and adhesion.

Climatic Conditions
Spray systems should not be applied when the wind velocity is greater than 15 M.P.H to avoid over-spraying of perimeter areas. Higher wind speeds also retard the exothermic reaction of foam and can lead to poor adhesion and increased density as well as poor surface texture of the foam itself.

Moisture in the form of rain, dew, frost can seriously affect the quality and adhesion of the insulating foam to the substrate or itself on new construction projects. FOAM-TECH does not recommend the spraying of this system when the relative humidity (RH) exceeds 85%. When heating the interior of a building the RH can change dramatically and should constantly be measured.

Equipment
The proportioning equipment shall be manufactured specifically for heating, mixing, and spray application of polyurethane foam and be able to maintain 1:1 metering with a ±2% variance. All proportioners shall have adequate main heating capacity to deliver heated and pressurized materials up to 130°F. Heated hose shall be able to maintain pre-set temperatures for the full length of the application hose. Minimum 2:1 ratio feeder pumps are required to supply stored materials through minimum 1/2-inch supply hoses. Pressurized and heated tanks systems may be used if sized appropriately to provide adequate flow at maximum operating capacity and temperatures.
CAUTION: Do not re-circulate the 'B' component for increased storage temperature as frothing or boil-over may occur at material temperatures above 60°F.
Guns such as GX-7, D-gun, Gap-gun, Fusion-gun, Probler with tip size approximately 16 lbs. per minute are suitable for most residential applications. Commercial cold storage, freezer applications, and large metal buildings may be insulated with higher gun outputs.

Processing Temperatures
Recommended processing temperatures; “A” Main 100-(110)-115°F, “B” Main 130-(130)-135°F, Hose 110-(115)-120°F are critical settings to reduce viscosity to allow balanced pressure during spraying. Balanced chemical output pressures are important to producing good mix. Foam output pressures greater than 200 psi differential indicates either improper chemical temperatures, or worn gun/packing parts. Unequal pressures will cause poor chemical mixing through the module and uneven backpressure. A critical requirement for good spray mixing requires appropriate tip/module sizing for the proportioner and adequate heating capacity. Unequal pressure (>200 psi) can cause excessive pump wear.

Spraying
FOAM-TECH does not recommend “flash passes” to very cold surfaces. Thin passes (1/4” or less) should be avoided. They may result in reduced yield and loss of adhesion. It is recommended that the design thickness be completed each day rather than partial application thickness.
This spray system should be applied in nominal uniform pass thickness of 2-inches, maximum pass thickness 3-inches. Application temperatures below 40°F may require reduction in application thickness. Additional thickness may be applied after a brief waiting period. Yield and in-place density is dependent upon the temperature of the substrate, ambient air temperature, gun speed application, gun tip size, and the output of the proportioning unit. SUPERGREEN III™ is designed to provide maximum yield when sprayed with full thickness (2”) passes. Excessive pass thickness can reduce density and physical properties. No charring or inter-foam discoloration is observed when insulation material is applied with proper mixing at 3-inch lifts.
SUPERGREEN III™ foam insulation shall not be applied over CPVC sprinkler pipe when pressurized for leak testing.

Vapor Barriers
The installation of minimal thickness of polyurethane foam insulation will provide an effective Air Barrier seal to reduce air migration traveling through the building walls when framing plates and windows are properly sealed. Economically driven projects may be specified with fiberglass insulation installed over the polyurethane foam to meet R-Value requirements. Combo System: If foam insulation is installed less than 2 1/2” to provide Air Barrier protection and fiberglass or another insulation material is installed to meet the R-Value requirements, a vapor barrier is **required** on the interior side (warm side) of the structure to keep moisture accumulation out of the wall system. Without this protection mold may grow within the wall. An air barrier is required on the outside of the structure if less than 2 1/2” of foam is installed.

Air Barrier
The installation of a minimum of 2 1/2” of SUPERGREEN III™ polyurethane insulation foam can provide an Air Barrier for many residential projects. 2 1/2” will not meet the insulation R-value requirements for most projects and added insulation is required. Depending upon geographic location, a vapor barrier will be required. Generally the vapor barrier is installed on the predominant warm side of the wall.

WARNING: POLYURETHANE FOAMS WILL BURN WHEN EXPOSED TO FIRE. Caution during application must be observed with signs posted for other trades, **"Caution Combustible Insulation, No Welding or Hot Work Allowed"**. On a daily basis remove all debris and shavings from the job site leaving a clean work area.

Fire and Thermal Barrier
Polyurethane foam insulation may present a fire hazard if exposed to fire or excessive heat (i.e. cutting torches, arc welders). The use of exposed polyurethane foam in interior applications on walls or ceilings presents an unreasonable fire risk unless protected by an approved fire resistant thermal barrier with a finished rating of not less than 15 minutes. A code definition of an approved "thermal barrier" is a material equal in fire resistance to 1/2" gypsum board.
Some areas of construction may require a code approved "ignition barrier" such as attics and crawl spaces rather than a 15 minute Thermal Barrier. Consult with FOAM-TECH personnel if you have questions regarding a specific application.

Storage of Raw Materials
All materials should be stored in their original containers and away from heat and moisture, especially after the seals have been broken and some materials have been used. Both components should be stored indoors, in drums, or in tanks jobsite at a temperature between 50°F and 75°F. Excessive low or high temperatures may decrease shelf life. Containers should be opened carefully to allow any pressure buildup to be vented safely. Extensive venting of the 'B' component may result in higher density foam and reduced yield. Materials stored at temperatures below 50°F will increase viscosity and application equipment may not be designed to reach spray temperature set points. Supply pumps and hose sizing must be of adequate size to provide adequate supply when materials are cold and have a higher viscosity.