

SPRAY FOAM GUIDELINES

These instructions cover safety and storage of SPEC TECHNOLOGIES SPRAY FOAM SYSTEMS. All personnel handling liquid polyurethane or polyisocyanurate foam components should familiarize themselves with the dangers and health hazards associated with these chemicals. Work crews should undergo a complete physical examination prior to working with isocyanates, polyurethane, or polyisocyanurate components, followed with periodic checkups if they continue working with such products. Employees with the following conditions should not work with these materials:

- Chronic respiratory disease
- Asthma
- History or presence of allergic disease
- Skin allergies, eczema

SAFETY EQUIPMENT AND VENTILATION

Protective Equipment

1. Supplied air-breathing apparatus with full-face mask or hood is recommended, however, an air purifying respirator may be permissible under specific conditions. An employer may determine that an air purifying respirator may be used based on the respiratory hazards to which the worker is exposed and the workplace and user factors that affect respirator performance and reliability. If a determination is made by an employer that an air purifying respirator is appropriate, that employer must have a written respirator program with a cartridge change out schedule to ensure that the cartridges are changed before the end of their service life.
2. Tyvex or similar coveralls.
3. Protective footwear or boots.
4. Impervious gloves.
5. Eye and face and neck protection if a half mask respirator is used.

Indoor Spraying Precautions

1. Isolate the environment of the area to be sprayed from the rest of the structure.
2. Spray only in well-ventilated areas. During spray operations, adequate flow of fresh air into the spray area must be maintained. Air from the spray area must be exhausted to the outdoors in a manner that prevents return into the interior of the structure through windows, doors, intake vents or conduits.
3. Keep spectators away from the spray area.
4. Smoking in the same area during spray operations shall be strictly prohibited.
5. Be sure to take proper precautions to not spray over unprotected energized lighting or electrical outlets. Doing so could be a fire hazard. Electrical wiring and conduit can be sprayed on as long as open energized circuits are protected.

Outdoor Spraying Precautions

1. Rope off the area within 150 feet (45.72 m) of the spray site.
2. Seal off all ventilation intakes within the affected area.
3. Erect windbreaks, when necessary, to confine the spray-mist to avoid damage to any surface near the work zone due to overspray or drift.
4. Keep spectators away from the spray area.
5. Be sure to take proper precautions to not spray over unprotected energized lighting or electrical outlets. Doing so could be a fire hazard. Electrical wiring and conduit can be sprayed on as long as open energized circuits are protected.

TOXICITY AND HEALTH CONSIDERATIONS

Skin Exposure

Contact with liquid isocyanates can cause reddening, swelling, and/or blistering of the exposed area if it is not removed promptly. If a person is subjected to a major splash or another type of massive exposure to liquid isocyanate (Component A), drench them immediately with water using a safety shower or hose-spray. All contaminated clothing, including shoes, should be removed and the isocyanate wiped from the skin with a clean, soft cloth. The affected area should then be cleansed with repeated soap and water washings and rinsing. If a rash or irritation develops, a physician should be consulted. Decontaminate clothing prior to reuse by soaking the garments in an 8% ammonia solution for one hour prior to laundering with hot water and detergent. Destroy all contaminated leather items including shoes, belts, watchbands, etc.

Eye Contact

Eyes should be immediately flushed with copious quantities of clean water for at least 15 minutes. Obtain medical attention immediately.

Inhalation

Adequate safety precautions must be followed even though respiratory discomfort may not be immediately apparent when using isocyanates (Component A). Inhalation of isocyanate vapors or mist can produce severe irritation. Excessive exposure will produce serious, possible irreversible pulmonary injury. Persons exhibiting symptoms of isocyanate exposure (severe coughing, tightness of chest, labored breathing) should be immediately removed from the contaminated area. If breathing has stopped, artificial respiration must be promptly applied. If breathing is labored and oxygen inhalation equipment is available, oxygen should be administered by trained personnel. Obtain medical attention immediately.

STORAGE

- A. The Iso component should be kept away from caustic solutions, tertiary amines, and water, to prevent rapid polymerization and accompanying generation of heat and gasses. Dangerous pressures can develop in closed containers.
- B. Protect all materials from moisture. Both components may contain volatile ingredients; therefore, keep the containers tightly sealed and store indoors at 60°F - 80°F (16°C to 27°C). **DO NOT STORE THE MATERIALS IN THE DIRECT SUNLIGHT.** Open the containers carefully, allowing any built-up pressure to be relieved slowly and safely.

FIRE AND EXPLOSION PREVENTION

- A. Nonflammable cleaning solvents should be used for cleanup. Solvent manufacturer's precautions must be observed. A sprinkler system, water spray, carbon dioxide or dry chemical extinguisher may be used for extinguishing fires involving liquid components. Fire fighters should wear self-contained breathing apparatus.
- B. **CAUTION:** Exposed foam insulation in an interior area presents an unreasonable fire risk. In no instance should polyurethane foam be installed without a suitable fire-resistive thermal barrier.

SPILL CLEANUP

- A. If a major isocyanate spill occurs, the area should be immediately evacuated and ventilated. Only cleanup personnel, properly equipped with respiratory and eye protection, should remain. Protective equipment for clean-up crews should include a positive pressure, self-contained breathing apparatus, equipped with full facepiece, hood or helmet and impervious clothing, footwear and gloves.
- B. Leaking containers should be moved outdoors, and the isocyanate transferred to other clean, dry containers, which must then be tightly sealed.
- C. Isocyanate spills should be covered with sawdust, vermiculite, fuller's earth, or other oil-absorbent material in quantities sufficient to absorb all of the liquid isocyanate. Shovel into an open-top container, transport outdoors and neutralize with a 3-8% ammonia solution by adding about 10 parts neutralizer per part of

diisocyanate while stirring. Let this solution sit in an unsealed container for approximately 48 hours. Dispose of the fully neutralized material in full accordance with federal, state and local hazardous waste regulations.

- D. Following removal of the neutralized isocyanate, the area should be washed down with an aqueous ammonia/detergent solution.

APPLICATION SPECIFICATIONS

- A. SPEC TECHNOLOGIES SPRAY FOAM SYSTEMS should be applied only by qualified, experienced spray applicators.
- B. For general and detailed specifications for most applications, consult the appropriate literature. The SPEC Technologies family of spray foams are a new generation of polyurethane products that exhibit superior substrate bonding, excellent interlayer adhesion, and a good smooth surface texture when correctly applied, and proper mixing is obtained during application. These processing instructions were developed to aid the spray contractor in obtaining a properly applied product, and **MUST** be followed within the limits specified to ensure acceptable quality foam. Failure to comply with these instructions, including the use of conventional processing techniques, may result in foam with poor cell structure, excessive and/or enlarged pinholes, poor interlayer adhesion, and/or an unacceptable rough surface texture.

STORAGE OF RAW MATERIALS

Protect all materials from moisture. Both components may contain volatile ingredients; therefore, keep the containers tightly sealed, and store indoors at 60°F -80°F (16°C to 27°C). **DO NOT STORE THE MATERIALS IN THE DIRECT SUNLIGHT.** Open the containers carefully, allowing any built-up pressure to be relieved slowly and safely.

CLIMATE CONDITIONS

Water (rain, fog, dew, frost, perspiration, relative humidity above 85%, etc.) will react chemically with the mixed components, adversely affecting the foam formation and resultant properties. **THEREFORE, THE SUBSTRATE MUST BE DRY AT THE TIME OF APPLICATION. TO AVOID EXCESSIVE OVERSPRAY, DO NOT ATTEMPT TO SPRAY WITHOUT PROPER CONTAINMENT IF THE WIND SPEED IS GREATER THAN 15-20 MILES PER HOUR.** Extreme caution must be taken to prevent overspray and fumes from contaminating other areas and properties.

SUBSTRATE TEMPERATURE

The appropriate grade SPEC Technologies spray foam should be chosen by the applicator according to the substrate temperature ranges noted on the Product Data Sheet under Processing Characteristics. At the bottom of the recommended temperature range, flash coats or thin passes are to be avoided.

SUBSTRATE PREPARATION

- A. For best results, all surfaces to be sprayed, including previously applied foam or coatings, must be clean, dry, and free of dirt, grease, release agents, loose or damaged protective coatings, or other contaminants. Existing silicone coatings, or traces thereof, must be completely removed, to assure proper adhesion of the foam to the substrate. Ferrometallic tank substrates should be sand blasted in accordance with Steel Structures Painting Council-SP6 (SSPC-SP6) or the National Association of Corrosion Engineers #3 (NACE). The surface must be carefully inspected and properly prepared prior to the application of foam, to ensure adequate bonding. An inspection of an existing built-up roof must include moisture testing and taking core samples to determine adhesion and integrity of the existing roof composite.
- B. A suitable primer should be applied to enhance the adhesion of the foam insulation to the surface, and to prevent corrosion of metal substrates. A vapor barrier may be required. Consult application specifications or a technical representative for recommendations. These recommendations, for surface preparation and the proper application of the products, must be followed:

Substrate		Primer
Built-Up Roofing:		
	Steep Asphalt	None Required
	Imbedded Gravel	None Required
	Weathered Felts	None Required
Concrete		None Required
Glass		None Required
Fiberglass Panels		None Required
Metal*:		
	Aluminum-Bare or Anodized	1-U-P or 2-E-P
	Copper	1-U-P or 2-E-P
	Galvanized Metal	1-U-P or 2-E-P
	Stainless Steel	1-U-P or 2-E-P
Wood	If possible moisture (roofing)	1-U-P

*SPEC TECH recommends sanding and/or etching metal products prior to primer application.

PROTECTIVE COATING AND FIRE BARRIER

Unprotected polyurethane foam insulation can be degraded by heat, sunlight, and water (rain, fog, dew, frost, hail, and humidity). Therefore, the foam insulation must be protected from these conditions with a properly designed protective coating system. SPEC TECHNOLOGIES SPRAY FOAM SYSTEMS offers a wide and comprehensive range of coating systems for a variety of climates and geographical locations.

The proper design of a protective coating system must take into consideration the following factors; climate, vapor permeability of the substrate, and temperature and relative humidity differentials between the interior and exterior of the structure. Such protective coating systems must themselves be protected from mechanical damage that might result from causes such as foot traffic, hail, and equipment, and must resist movement and displacement under these conditions.

CAUTION: Polyurethane foam used on the interior of a structure must be protected by an approved 15 minute thermal barrier. When exposed to open flame, cured polyurethane foam will present a serious fire hazard.

Prior to designing and installing a spray polyurethane foam perimeter insulation system, code officials should be consulted for recommendations and approvals. Federal, local and state building codes vary. All require that spray applied polyurethane foam insulation be covered with an approved 15 minute fire rated thermal barrier. One typically approved material is 1/2" (1.27 cm) gypsum wallboard applied over the spray polyurethane foam insulation. However, always check with local officials for recommendations and approvals. It is recommended that the approved thermal barrier be installed the same day the foam is applied.

All hot work, i.e., welding, torches and open flame work, must have been completed prior to commencing the installation of the polyurethane foam insulation.

SPRAYING

The spraying technique should be such that enough material is applied to cover the surface, without running or sagging. Each layer of built-up foam should be at least one-half inch thick; if one-quarter inch or less in thickness, the foam layer may be of generally poor quality, have weak, elongated cells, and have poor interlayer adhesion. The applied foam should be allowed to rise completely before another layer is applied. Successive layers should be applied within fifteen minutes for optimum interlayer adhesion, with a suggested minimum waiting period of approximately five minutes between layers. The gun's spray pattern must be well defined and properly directed to minimize overspray. Foam should be applied to cylindrical vessels with "passes" made along the vessel's axis with the gun directed normal to the surface. Spray coverage should be such that a convenient area is built up to the desired thickness before moving on to another area.

CAUTION: Do not apply closed cell foams in excess of two inches per pass as this may cause weakening of the foam and discoloration. Open cell foams may be sprayed at greater thickness than closed cell foams without adversely affecting quality. Please check the individual Product Data Sheet for more detailed spray parameters.

The temperature of the Poly component must be above 60°F (16°C) when fed to the proportioning pump from drums. DO NOT exceed 85°F (29°C) as the blowing agent in the Component B boils at higher temperatures. During hot months, take care that the Poly component held on the jobsite is kept from overheating. Store or hold drums in the shade, out of the direct sun, and use supplemental cooling under extreme temperature conditions. At lower temperatures, the Poly component is more viscous, and is very difficult to pump. To properly feed the Poly component from the drum, a 2 to 1 or larger transfer pump of the divorced type (to prevent leakage) and oversize hose of minimum length are strongly recommended to prevent starving the proportioning pump, causing cavitation and an off-ratio condition. Do not exceed the equipment manufacturer's maximum recommended feed pressures.

EQUIPMENT

Spray foam equipment must be properly maintained and operated. READ AND FOLLOW THE EQUIPMENT MANUFACTURER'S INSTRUCTIONS AND RECOMMENDATIONS.

The spray equipment must be capable of metering each component within +/- 2% of the specified ratio of 1:1 by volume. A 2 to 1 transfer pump for both components is required, to adequately supply the metering pump (please consult the machine manufacturer). To produce acceptable foam, the spray gun must provide intensive and thorough mixing of the components at the operating throughput. Generally, higher mixing (impingement) pressures improve the foam yield, physical properties, cell structure, and insulation characteristics. The optimum temperatures of the components may vary with the type of equipment and the particular application. Ensure that the Iso component comes in contact only with isocyanate vessels and pumps; and the Poly component in contact only with resin vessels and pumps. Dry nitrogen, or dry air dew point -40°F (-40°C)), should be used to blanket both components as moisture will adversely affect both components. The equipment manufacturer's recommendations on maximum hose lengths and the possible need for a supplemental hose heat booster must be strictly followed. Increasing the hose length and/or raising the gun high above the proportioning pump, i.e., spraying on a high roof with the proportioning unit at ground level, will reduce the operating pressure at the gun.

NOTE

Functioning pressure gauges and thermometers will occasionally give incorrect readings. Therefore, if you note what appears to be inaccurate or unreasonable pressure and/or temperature readings, change the questionable pressure gauge or thermometer and check the reading of the new unit.

EQUIPMENT RECOMMENDATIONS

The following is the recommended Graco equipment and guns to dispense GacoFoam:

	Model	Maximum Rated Pressure	Heat Rating	Maximum Hose Length	LB # PM
Reactor	E 20	2000	6,000 watts	310	18
Reactor	E 30	2000	10,200 watts	310	34
Reactor	H 25	2000	8,000 watts or 15,300 watts	310	22
Reactor	H 40	2000	8,000 watts or 15,300 watts	310	40
Reactor	H 50	2000	15,300 watts	310	50

HYBRID AND CUSTOM EQUIPMENT

Proportioners, spray guns and outputs other than the above have not been evaluated by SPEC TECH.. The above processing guidelines can be used as a starting point for properly processing SPEC TECHNOLOGIES SPRAY FOAM SYSTEMS in other equipment. The APPLYING CONTRACTOR/user is responsible for determining the suitability and/or the proper operating conditions for such equipment.

The Product Data Sheet as well as the equipment manufacturer's Operation Manual, should be utilized for general troubleshooting. DO NOT CONTINUE APPLYING FOAM IF A PROBLEM EXISTS. Troubleshoot and remedy the problem before proceeding.

The aforementioned information on this product is to be used as a guide and is subject to change without notice. These suggestions and data are based on information we believe to be reliable. They are offered in good faith, but without guarantee, as conditions and methods of use of our products are beyond our control. Any obligation of the seller or manufacturer shall have no force or effect unless it is in writing and signed by officers of the manufacturer. ALL WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE AND THAT GOODS ARE OF MERCHANTABLE QUALITY, ARE

SPECIFICALLY DISCLAIMED. See SPEC TECHNOLOGIES SPRAY FOAM SYSTEMS for information concerning additional warranty information.

TROUBLESHOOTING

The following is a supplemental troubleshooting guide specifically for SPEC TECHNOLOGIES SPRAY FOAM SYSTEMS family of spray foams:

Conditions and Things to Check

- Rough Surface
 - Heat of components too low at gun ("Tree bark" texture).
- Texture
 - Heat of components too high at gun ("Popcorn" texture).
 - Using improper reaction rate version of GacoFoam for ambient conditions.
 - Spraying in too high winds.
 - Improper spray angle.
 - Overspray.
 - Improper mix module or chamber.
- Pinholes
 - Operating pressure of components too low.
 - Improper mix module or chamber.
 - Heat of components too low at gun.
 - Off-ratio.
- Poor Interlayer Adhesion
 - Too much delay between passes (more than 15 minutes).
 - Moisture on surface - because of high humidity/condensation, fog, dew, etc.
 - Passes too thin.
 - Off-ratio (Poly(B) component starved).
- Slow Reactivity
 - Temperature of substrate too low.
 - Heat of components too low at gun.
 - Using improper reaction rate version of for ambient conditions.
 - Off-ratio (Poly(B) component starved).
 - Improper mix module or chamber.
- Poor Cell Structure
 - Passes too thin.
 - Off-ratio.
 - Pressure of components too low at gun.
 - Second pass applied too quickly.
- Blowholes
 - Drop of moisture on surface being sprayed due to rain, perspiration, vent/stack emissions, etc.
- Frothing of Spray Mixture at Gun
 - Heat of components too high at gun.
 - Off-ratio (Poly(B) component starved).