SWD Spray Foam Installation Manual

Polyurethanes

Polyurethanes are made by mixing an A-side comprised of an isocyanate or derivative and a B-side comprised of a polyol. SWD Urethane only used MDI isocyanates, which are the most mild and non-toxic of the major isocyanates used for polyurethane production. The B-side mixture contains polyol(s), surfactant(s), catalyst(s), a blowing agent and often flame retardants, dyes or other materials. The polyurethane reaction is exothermic, meaning it creates heat as the A-side and B-side chemicals react. The resulting liquid mixture quickly expands many times its original size to create polyurethane foam.

For more information on polyurethane foam chemistry and formulation, please visit the following websites:
www.polyurethane.org
www.sprayfoam.org
http://en.wikipedia.org/wiki/Polyurethane

Products

SWD Quik-Shield® | 106 is a 0.5 lb density open cell foam designed for insulating walls, panels, or other cavities or void fill needs. Open cell foam is a natural noise reduction material and has higher R-value than fiberglass insulation, making it an ideal solution for home or office wall insulation.

SWD Quik-Shield® | 111 is a 2.0 lb density closed cell foam designed for insulating walls, structural panels, or silo or tank insulation. Closed cell foam creates an effective air barrier in building applications and provides exceptional building insulation with an R-value of 6.26 per inch.

SWD Quik-Shield® | 112 is a 2.0 lb density closed cell foam designed for insulating walls, panels, structural panels, or silos and tank insulation in cold weather environments where spray conditions may drop to 30°F.

SWD Quik-Shield® | 125 is a 2.5-3.5 lb density closed cell foam designed for roofing applications. Roofing foam creates and effective air barrier plus provides high R-value insulation as part of a seamless, waterproof roofing solution.

SWD Quik-Shield® product data sheets include more detailed product descriptions and applications as well as physical property, storage and handling and application information. Please visit SWD Urethane on the web for up-to-date product data sheets at www.swdurethane.com/products.

Storage and Handling Procedures

Every contractor, applicator or customer of SWD should read and become familiar with the product Material Safety Data Sheet (MSDS) shipped with every SWD product. The MSDS contains safety information related to personnel, fire, accidental releases, first aid, handling and storage. Storage and shelf-life instructions are also included on the back of every product data sheet, available on the web at www.swdurethane.com/products.

All polyurethane material should be handled in accordance with industry standard guidelines as published by the Center for Polyurethanes Institute on their website www.polyurethane.org. Applicators should follow the guidelines put forth in the CPI documents *Working With MDI and Polymeric MDI: What You Should Know* and *Polyol Resin Blends Safety and Handling Guidelines.*

Equipment Selection and Maintenance

Spray polyurethane foam requires specialized plural component dispensing equipment. SWD Urethane recommends following the industry standard guidelines from the SPFA when selecting equipment. The guide *Spray Polyurethane Foam Equipment Guidelines* can be found on the industry website at www.sprayfoam.org. SWD Urethane maintains a listing of current approved vendors of plural component dispensing equipment and parts on its website at www.swdurethane.com.

Application Instructions

Applicators and spray foam contractors should be familiar with and install SWD products in accordance with industry standard guidelines, specifically the Spray Polyurethane Foam Alliance's (SPFA) document titled *Spray Polyurethane Foam for Residential Building Envelope Insulation and Air Seal* and subtitled *Recommended Design Considerations and Guide Specifications* (document AY 112), and any manufacturer's specific instructions located on the back of the product data sheet. All product data sheets are available at www.swdurethane.com/products.

Quality Control

A quality foam application is characterized by a consistent surface that is free from dimples, holes, roughness and ridges. Most field problems can be traced to equipment settings or failures. Applicators should have the necessary tools and know-how to repair most basic equipment problems in the field and should always have a spare parts kit for the spray gun, if not a backup spray gun available. Spare parts kits should include O-rings, screens and spray tips at a minimum.

Substrate Preparation

All substrates should be clean and free from condensation, moisture, grease, oils, dirt, loose debris or anything else that might interfere with the adhesion of the foam to the substrate or the chemical reaction of the rising foam.

Material Temperatures

Proper material temperature is very important for the foam to perform as intended. Material that is too cold will spray in a much narrower pattern, which drives into the rising foam on the substrate and causes surface irregularities including dimples, holes and rough, popcorn or even treebark surfaces. If materials are too hot, the foam will react too fast to allow for a steady even rise on the spray front. It will be difficult to maintain a level spray pattern and surface irregularities may begin to appear, even though the spray pattern from the gun is full. Temperature guns are excellent tools to identify temperature related issues. Temperature guns can be pointed at the spray pattern to measure the material temperature right as it leaves the gun or even as it sits in the drums. SWD highly recommends all applicators and contractors carry this important tool with them in their spray rigs to help trouble shoot temperature and equipment problems.

Operating Pressures

Incorrect, off-ratio, or imbalanced operating pressures cause the material to mix off-ratio, whether hydraulic, air or electrically driven equipment is used.

Restriction and Starvation

Restriction results when something is blocking the material from normal flows from the transfer pump to the proportioning unit to the spray gun. Common examples of restriction are jammed guns or blocked lines. Starvation results from a lack of material reaching the proportioning unit and consequently the spray gun. Starvation usually results from pump problems.

Irrespective of the material or density used, or skill or experience of the applicator, modern spray foam equipment will not provide the proper and consistent spray pattern required if the transfer pumps or proportioning unit do not perform according to spec. Slight or momentary

proportioning unit cavitations or line blockages may not be noticed immediately but will result in momentary poor spray patterns (hiccups) or poor foam quality in certain affected areas. If spray or foam performance hiccups are noticed with regularity or are increasing in frequency, the applicator should stop spraying foam and thoroughly check the spray equipment for restriction or starvation problems until rectified.

Off-Ratio

All SWD spray foams must be sprayed at their stated ratios in order to perform according to the product specifications. Off-ratio spraying can be caused by equipment failures, restriction or starvation problems in the equipment or lines, blockages in the spray gun, or incorrect settings on the proportioning equipment.

Off-ratio foams can be identified by the following characteristics:

A (Isocyanate) Rich	**B (Polyol) Rich**
- dark in color with a smooth hard surface - glassy, irregular cell structure - friable and brittle foam - density is out of spec - improper foam rise	- light in color, almost white foam - slow or insufficient rise - soft or spongy - improper cell structure - irregular and course surface texture - blow holes or pinholes are present

Typical Field Problems, Probable Causes and Recommended Solutions

Problem: A stream of material exits the gun, not a spray.

Probable cause: The material temperature is too cold. Increase the temperature as necessary. Check to make sure hose heaters are function from the proportioning unit all the way to the spray gun and that other electrical heating equipment is functioning properly, including drum heaters and recirculation heaters.

Problem: The foam does not fully expand.

Probable cause: The material temperature is not hot enough. Increase the temperature as necessary, checking hose heater function from the proportioning unit all the way to the spray gun and any other heating equipment, including drum heaters and recirculation heaters. If the material temperature is within spec, check the transfer pump pressure to the proportioning unit for adequate pressure or possible starvation issues. If the transfer pumps are functioning properly, check the proportioning pump for leaks or damage.

Problem: The foam has a popcorn surface.

Probable cause: If the material exits the gun in a stream, the material is too cold. If the material exits the gun in normal spray pattern, the material is too hot. Modify the temperature as necessary to achieve a proper spray pattern and surface characteristics.

Problem: The spray gun sprays a small spray pattern with large droplets.

Probable cause: Lack of pressure from the transfer pump to the proportioning unit is the probable cause. Check and repair the transfer pumps as well as the proportioning unit pumps. If no faults are found in the pumps, check for starvation between the proportioning unit and the spray gun.

Problem: One of the material gauges will show sustained low pressure readings.

Probable cause: Starvation or restriction between the material and the pressure gauge. Check the transfer pump from the material experiencing the starvation/low pressure. Follow the transfer pump line from the material to the proportioning unit pressure gauge until the problem is identified.

Problem: Cavitations or momentary drops in a material pressure gauge.

Probable cause: Starvation or restriction between the material and the pressure gauge. Check the transfer pump from the material experiencing the starvation/low pressure. Follow the transfer pump line from the material to the proportioning unit pressure gauge until the problem is identified.

Problem: Momentary increases in a material pressure gauge.

Probable cause: Starvation or restriction between the proportioning unit (the pressure gauge) and the spray gun. Thoroughly check the proportioning unit from the pump with the material experiencing the high pressure out to the spray gun until the problem is identified.

Problem: A-rich (isocyanate) spray foam.

Probable cause: Restriction in the line or starvation of B-side material. Check for high pressure on the B-side pressure gauge and then search for the restriction between the proportioning unit console and the spray gun. If the B-side pressure gauge reads low pressure, there is a starvation problem. Search for the problem between the material supply and the proportioning unit.

Problem: B-rich (polyol) spray foam.

Probable cause: Restriction in the line or starvation of A-side material. With restriction, there will be a high pressure reading on the A-side pressure gauge. Check for problems between the pressure gauge and the spray gun. With starvation, the A-side pressure gauge will read low pressure. Check for problems between the material and the proportioning unit.

Problem: Applied foam irregularities with no pressure, ratio, temperature, restriction or starvation problems. Some of the irregularities could be slow rise or reaction time, poor cell structure, wrong color, blow holes or pinholes, out of spec density, frequent clogging of equipment, poor spray pattern, friable foam, slow curing foam or other very poor physical properties.

Probable causes: There could be a variety of problems in this situation. Begin by checking the following:

- Failed or failing gauges, including pressure gauges
- Moisture contaminated A-side
- Substrate contamination with dirt, oils, greases, incompatible primers or other contaminants
- Improper substrate preparation
- Aged material beyond the shelf-life on the label
- Loss of blowing agent in the B-side due to improper storage

If you are unable to identify the source of the problem, contact SWD Technical Support at 800-828-1394.

Safety

Every contractor, applicator or customer of SWD should read and become familiar with the product Material Safety Data Sheet (MSDS) shipped with every SWD product. The MSDS contains safety information related to personnel, fire, accidental releases, first aid, handling and storage and should be kept available with the SWD product at all times.

Safety cannot be overemphasized enough. SWD highly recommends following the industry standard safety guidelines published by the Center for Polyurethanes Institute (CPI) and also the Spray Polyurethane Foam Alliance's (SPFA), both available on the web at www.polyurethane.org and www.sprayfoam.org, respectively. Two particular CPI publications that should be reviewed are the *PMDI User Guidelines for Protective Clothing Selection* and the *Model Respiratory Protection Program*. SWD highly recommends that every contractor also review and implement the SPFA's *Contractor Safety and Product Stewardship Program*, available on the SPFA website. This document addresses fall protection, includes safety meeting agendas and checklists, recommends a respirator program and addresses safety generally and is an excellent document and program to ensure safe working conditions for all involved in the job.

Other Instructions

Contractors and applicators should keep a record of all jobs, the dates sprayed, the applied densities of foam and the ambient, material and substrate temperatures during spray times. SWD has provided a sample log with spaces for the above information, also available on the web at www.swdurethane.com.