PREFERRED SOLUTIONS, INC.

INSTALLATION GUIDE

Staycell ONE STEP® 502 HFO
Intumescent Spray Foam Insulation

General Information

Staycell ONE STEP® 502 HFO is a spray polyurethane foam system intended for installation by qualified contractors trained in the processing and application of closed-cell, rigid polyurethane foam systems as well as plural-component dispensing equipment. Contractors and applicators must comply with all applicable storage, handling, processing and safety guidelines. Preferred Solutions, Inc. should be consulted in all cases where the application conditions or materials are questionable. Refer to the Staycell ONE STEP® 502 HFO technical data sheet and SDS sheets for additional information.

Cautions & Recommendations

Staycell ONE STEP® 502 HFO is not designed for use as an exterior roofing system. Coolers & freezers demand special design considerations with regard to thermal insulation and moisture/vapor drive. Staycell ONE STEP® 502 HFO should not be installed in coolers or freezers unless designed by a certified professional. PSI Authorized Applicators must contact Preferred Solutions, Inc. prior to any application in cold storage structures.

Improperly installed foam plastic insulation materials in walls or ceilings may present a fire hazard. Contact Preferred Solutions, Inc. for approved configurations and assemblies prior to application.

Worker Exposure Hazards: Both Components “A” and “B” can cause severe inhalation and skin sensitization. Please refer to the Staycell ONE STEP® 502 HFO technical data sheet and Safety Data Sheets (SDS) for more information.

In addition to reading and understanding the SDS & technical data sheets, all applicators and workers who may come into contact with the Staycell ONE STEP® 502 HFO must be trained in the safe usage of spray polyurethane foam, with emphasis on appropriate respiratory, skin and eye protection (PPE - Personal Protective Equipment). To obtain safety information and training materials, visit Preferred Solutions Inc.’s (PSI) website www.preferredsolutions.net, Spray Polyurethane Foam Alliance (SPFA) www.sprayfoam.org and the Center for the Polyurethane Industry websites www.spraypolyurethane.com and www.polyurethane.org.

For interior applications, full body protection is recommended including an air-supplied respirator such as a self-contained breathing apparatus (SCBA) or a supplied air respirator (SAR) in the positive pressure or continuous flow mode (this includes air supplied hoods). Alternatively, a full-face air purifying respirator with suitable organic vapor/particulate filter combination cartridge (OV/P100) may be worn.

Environmental & Substrate Conditions

Applicators must recognize and anticipate climatic conditions prior to application to ensure the highest quality foam and to maximize yield. Ambient air and substrate temperatures and moisture are critical determinants of foam quality, which will influence the chemical reaction of the two components, directly affecting the yield, adhesion and the resultant physical properties of the foam insulation.

For optimal results, Staycell ONE STEP® 502 HFO should be applied to substrates when ambient air and substrate temperatures are between 70ºF and 120ºF. The minimum recommended air and substrate temperature is 30ºF. Please refer to the Cold Weather Processing Guide for applications below 40ºF.

PSI does not recommend the spraying of this system when the relative humidity (RH) exceeds 85%. Excessive wind velocities may result in loss of exotherm and interfere with the mixing efficiency of the spray gun affecting foam surface texture, cure, physical properties and will cause overspray. Precautions must be taken to prevent damage to adjacent areas from overspray.

All surfaces must be clean and dry, free of dirt, oil, solvent, grease, loose particulates, curing compounds, frost, ice and other foreign matter, which could inhibit adhesion. Moisture content and surface conditions of substrate are critical to adhesion and need to be verified for each condition in small test areas before proceeding with full

application. Prime substrates if necessary. Suitable substrates include gypsum sheathing, OSB, plywood, lumber, CMU, structural and lightweight concrete and galvanized, aluminum and painted metal. Lightweight insulating concrete or other friable substrates are not recommended.

In freezing conditions (≤32º F), when adding heat to the spray area, it may be required to maintain an elevated temperature during the foam cure cycle (24-72 hours) so extreme temperature drops to the “green“ foam are not experienced, which could cause shrinking or cracking. PSI should be consulted in all cases where application conditions are marginal.

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 by volume with ± 2% variance. All proportioners shall have adequate main heating capacity to deliver heated and pressurized materials up to at least 135º F. Heated hose shall be able to maintain pre-set temperatures for the full length of the hose. Minimum 2:1 ratio transfer pumps and ¾ inch supply hoses are recommended to feed material from drum to the proportioner.

Recommended equipment:

- Graco or PMC proportioners set at 1:1 volume ratio. Gear pump proportioners are not suitable.
- Graco Fusion AP, Probler P2 or PMC AP-2, AP-3 or Xtreme spray guns. Use AR5252 (02) mixing chamber or larger. Cartridge-type guns such a Graco Fusion PC or Fusion FX are not suitable.
- Minimum 2:1 ratio Graco or PMC “stick” transfer pumps or equivalent.

Spraying / Processing Information

1. **The Staycell ONE STEP 502 product is shipped in open-head drums. Both the resin & isocyanate components (Components “A” and “B”) contain fine, solid particles and each drum must be mixed before use. Before starting, ensure workers are wearing appropriate Personal Protective Equipment (PPE). As with any drum containing spray polyurethane foam components, relieve any pressure buildup on the container by slowly and carefully loosening bung caps. Remove retaining ring and lid only after all pressure has been relieved.**



Examples of Personal Protective Equipment



Relieve pressure by slowly and carefully loosening bung cap.



Remove red drum tag/seal and loosen bolt. Do not remove until all pressure in container has been relieved.



Remove ring and lid. Set aside and keep clean. Replace lid back on drum after mixing.

2. **Both the A-Isocyanate and B-Resin drums need mixed before use. Mix thoroughly using a strong, electric drill with drum length mixing blades. The purpose of mixing the drum is to thoroughly suspend the fine, solid particles uniformly in the drums. <u>MIXING SHOULD TAKE NO LONGER THAN 2-4 MINUTES. DO NOT MIX CONTINUOUSLY, WHICH CAN ENTRAP AIR AND MOISTURE THAT CAN CAUSE CRYSTALLIZATION OF THE ISOCYANATE "A" COMPONENT.</u> After mixing is complete, remove mixer, replace lid (with gasket intact) and tighten ring/bolt.**



Electric drill with drum-length mixing blades. Separate blades are needed for each component.



When mixing, ensure blade touches bottom of drum to mix any particles that may have settled to the bottom during shipping/storage. Mix thoroughly from side-to-side and from top-to-bottom. After mixing is complete, replace lid and tighten ring.

3. **After mixing, replace lid and ring and tighten bolt completely. Drum pumps should have collars that thread into the bung to keep the drum sealed. <u>Use moisture desiccants on the isocyanate (Component "A") drum.</u>**

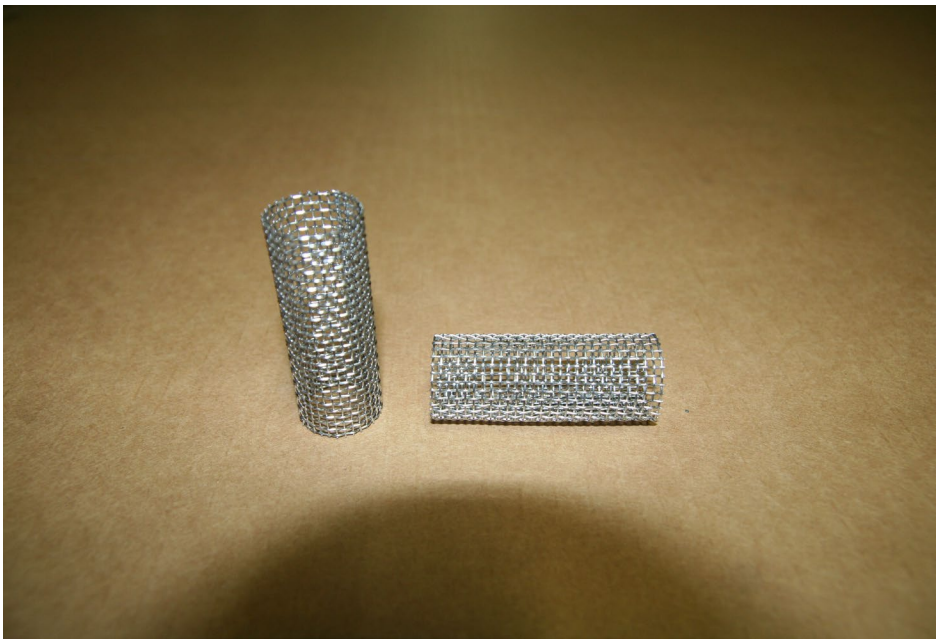


After mixing, replace lid and seal tightly. Use collars on drum pumps and use moisture desiccants on the isocyanate (Component "A") drum.

4. **Remove standard strainer screens from y-strainers at base of proportioner and replace with screens (12 mesh) provided by PSI.**



Standard Graco or PMC y-strainer

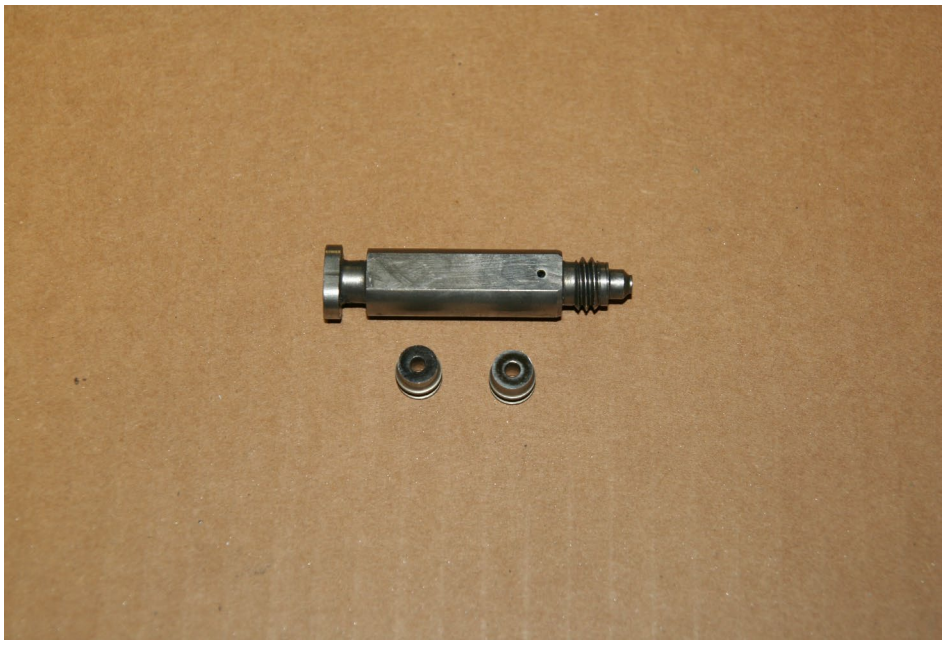


Replace standard y-strainer screens with 12-mesh screens provided by PSI

5. **Use Fusion AP, Probler P2 or PMC AP-2, AP-3 or Extreme spray guns with AR5252 (#2) or larger mixing chamber. Use steel/metal side seals. Remove and leave out gun screens.**



Graco Fusion AP Gun. Remove and leave out gun screens.



AR5252 mixing chamber and steel side seals for Graco Fusion AP spray gun

Additional Information:

6. **If proportioner is filled with solvent, flush with Staycell® 504 HFO or other compatible, closed-cell HFO-blown foam, then follow with the Staycell ONE STEP® 502 HFO.**
7. **To minimize cross-contamination when switching back and forth between solvents, different foam types/products/manufacturers, re-route the pressure relief/re-circulation lines to drain into 5-gallon pails rather than back into the drum.**
8. **Make sure Components "A" and "B" are warm (approximately 70°F). Heated trailers, hot-boxes or other temperature controlled areas may be necessary.**
9. **Recommended starting air pressure to the transfer pumps is 100 psi, adjust upward or downward as necessary.**
10. **Processing temperatures: Pre-heaters for Component "A" and "B" and Hose: 120°-135°F.**
11. **Pressure: Typical static proportioner pressures are between 1,300-1,500 psi with typical dynamic spraying pressures between 1,100-1,300 psi. Adjust pressure up or down depending on quality of spray pattern, quality of mix, type of machine, hose diameter and hose length.**
12. **Spraying: In preparation for spraying, an off-target test spray should be performed to verify the processing pressure, primary heater and hose temperature settings. It is 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.**

Staycell ONE STEP® 502 should be applied by spraying perpendicular (90° angle) to the substrate at an approximate 18-24" distance. Apply by spraying into the wet line as it is rising, overlapping each pass approximately 50%-80%. It is recommended that the total design thickness be completed each day. If the processing parameters in #8-12 above 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 unreacted for several seconds. This spray system should be applied in uniform, minimum pass thickness of ½" and a maximum pass thickness of four inches. Spraying sections too thick, too fast may result in charring of the foam, or in extreme conditions a fire may result. Thin "flash" passes (<1/4 inch) should be avoided as it may result in poor chemical reaction, poor physical properties, reduced coverage and loss of adhesion 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 thickness, allow the foam lifts to cool to 100°F (38°C) or below before additional foam is 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. To avoid heat damage when applying over membranes (such as Blueskin SA), apply initial pass in maximum one-inch thickness and allow to fully cool before subsequent passes. Water on the substrate from rain, fog, condensation, etc. will affect the chemical reaction of the foam adversely affecting the physical properties, performance and adhesion. It should not be applied when the relative humidity is above 85%. For applications where the substrate and/or ambient air temperature is <40°F, refer to the Cold Weather Processing Guide.

As with all SPF systems, improper application techniques should be avoided. Examples of improper application techniques include, but are not limited to, excessive thickness of SPF and off-ratio material. Potential results of improperly installed SPF include dangerously high reaction temperatures that may result in fire and offensive odors that may or may not dissipate. Improperly installed SPF must be removed and replaced with properly installed materials. On a daily basis remove all debris and shavings from the jobsite leaving a clean work area.

13. **The Staycell ONE STEP 502 HFO should not be left in the equipment longer than two (2) days. If longer, spray or re-circulate fresh ONE STEP into system or flush out as instructed below.**
14. **To flush Staycell ONE STEP® 502 HFO out of complete system, use standard closed-cell foam, such as Staycell® 504 HFO or other compatible HFO-blown foam. Procedure: Remove transfer pumps from ONE STEP drums, wipe clean and put in drums containing standard foam. Pump or spray a gallon or two through the proportioner, then stop. Relieve proportioner pressures, open y-strainers, remove and clean 12-mesh screens. Once clean, put 12-mesh screens back in y-strainers and either pump or spray foam through the proportioner until new foam comes out the gun. Standard strainer screens and gun screens must be left out until all particulate is cleared, which can take several sets. Equipment should be cycled every two (2) to three (3) weeks (at a minimum the A-Isocyanate side) to prevent crystallization of the iso inside the hoses and proportioner. Alternatively, for longer term storage, the complete system can be flushed with a variety of conventional foam flushing solvents.**
15. **To store Staycell ONE STEP® 502 HFO, ensure lids (with rubber gaskets intact) and bung caps are tightly sealed. Use moisture desiccants on Component "A" drums that have been opened.**

Handling & Storage

Handling and Storage

Both components should be stored in their original containers and away from excessive heat and moisture, especially after the seals have been broken or some materials have been used. Drums should be stored indoors and maintained between 65° - 85°F. Containers should be opened carefully to allow any pressure buildup to be vented safely while wearing full safety protection. Excessive venting of Part "B" component may result in higher density foam and reduced yield. Materials stored at temperatures below 65°F will increase viscosity and some application equipment may not reach adequate spray temperature set points. Supply pumps and hoses must be sized to provide adequate supply when materials are cold and at a higher viscosity.

Do not store in direct sunlight. Water, solvents or oil in the liquid components will degrade foam quality. Protect from heat, sparks and open flame. Do not cut or weld near this container. Do not smoke near container. Do not store near food or feed.

Shelf Life

Excessive low or high temperatures may decrease shelf life. Staycell ONE STEP® 502 HFO has a shelf life of approximately six (6) months from the date of manufacture when stored in original, unopened containers between 65° - 85°F.

Limited Warranty Information

The technical and application information herein is based on the present state of our best scientific and practical knowledge and is provided to users to help determine suitability of our products for specific applications. Our products are intended only for sale to PSI Authorized Applicators. Customers of our products assume full responsibility for quality control, testing and determination of suitability of products for their intended application or use, including compliance with applicable building regulations. We warrant that our products meet our written liquid component specifications. We make no other warranty of any kind, either express or implied, by fact or law, including any warranty of merchantability or fitness for a particular purpose. Our total liability and customers' exclusive remedy for all proven claims is to receive replacement of non-conforming products and in no event shall PSI be liable for incidental, consequential or any other damages. PSI's technical literature and installation guides are updated on a regular basis; it is the user's responsibility to obtain and to comply with the most recent versions. Information contained in data sheets and installation guides may change without notice.

Revised 10/27/26

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