

Patriot 200 HFO

TECHNICAL DATA SHEET & SPRAY GUIDELINES LOW GWP



PATRIOT FOAM

Patriot 200 HFO LOW GWP CLOSED-CELL SPRAY FOAM

Patriot 200 HFO is a two-component, medium density, one to one by volume spray polyurethane foam (SPF) system. Patriot 200 HFO system consists of an "A" component (ISO) and a blended "B" component (Resin) in separate drums. Patriot 200 HFO contains low GWP 1233zd blowing agent technology. Patriot 200 HFO is a medium-density foam in compliance with ICC 1100 and ICC AC 377.

Physical Properties					
Core Density	ASTM D1622	200 pcf ± 0.10	Shear Strength	ASTM C273	45 psi
R-Value @ 1"	ASTM C518	7.6	Tensile Strength	ASTM D1623	50 psi
R-Value @ 2"	ASTM C518	15	Air Permeance @ 1"	ASTM E2178 @ 75 PA	< 0.031 L/sm²
R-Value @ 3"	ASTM C518	22	Dimensional Stability	ASTM D2126	<5.8%
R-Value @ 4"	ASTM C518	30	Compressive Strength	ASTM E1621	35 psi
Water Vapor Permeance	ASTM C355	0.73 @ 1.5 inch	Shelf Life	6 months when stored between 50°F - 75°F	
Water Resistance	AATCC TM 127-2014	Pass			
Closed Cell Content	ASTM D1940	93%			
Intertek Certified Clean Air Gold: Conforms to California Department of Public Health (CDPH) Standard Method v1.2: Private Office and School Classroom			CDPH 01350 v1.2: PO, SC, R for VOC emissions and formaldehyde		
Liquid Properties		A-SIDE: PMDI Isocyanate		B-SIDE: Patriot 200 HFO Resin	
Color		Brown		Light Amber	
Viscosity (Brookfield cps) @ 77°F		200 ± 30		650 ± 50	
Specific Gravity		1.24		1.22	
Mixing Ratio (volume)		1:1		1:1	
Fire Test Results					
Flammability : Class A (Class 1)		ASTM E84 @ 4"		<25 Flame Spread <200 Smoke Development	
Large Scale Fire Testing: Ignition Barrier		AC 377 Appendix X*		PASS: NO COATING	
Large Scale Fire Testing: Thermal Barrier		NFPA 286*		PASS: 16 Wet Mills DC 315	
Patriot 200 HFO meets or exceeds the IBC requirements for exterior walls in type I, II, III, IV and V construction. This includes NFPA 285 and NFPA 259 testing with Intertek Listings (GWL/FIP 30-02, GWL/FIP 30-03).					
Reactivity Profile					
Cream Time	0-1 seconds	Gel Time	2 seconds	Tack Free	3-4 seconds
				End of Rise	4-6 seconds

* See Intertek CCRR-0375 for additional instructions or consult with Patriot Foam's Technical Department for details at 850.640.0285.

PROCESSING PARAMETERS



Pressure (Dynamic)

- 1000-1400 psi, depending on mix chamber

Machine Temperature

- A-Side: 105° to 125°F (41° to 52°C)
- B-Side: 105° to 125°F (41° to 52°C)

Hose Heat Temperature

- 105° to 125°F (41° to 52°C)

Substrate Temperature

- Patriot 200 HFO Regular: 60° to 90°F (16° to 32°C)
- Patriot 200 HFO Summer: 90° to 120°F (32° to 49°C)
- Patriot 200 HFO Winter: 20° to 60°F (-7° to 16°C)

Drum Temperature

- A-Side: 50° to 75°F (10° to 24°C)
- B-Side: 50° to 75°F (10° to 24°C)

• MAXIMUM PASS THICKNESS: 3 INCHES

• Optimal temperature and pressure setting are affected by the equipment being used, as well as ambient and substrate temperatures.

• **Important:** Many factors affect yield, including substrate temperature, substrate type, and pass thickness. Multiple passes will significantly reduce yield. Larger mixing chamber sizes and higher pressure settings will also reduce yield.

PROCESSING INSTRUCTIONS - READ CAREFULLY

Agitation	DO NOT agitate.
Drum Temperatures & Recirculation	DO NOT RECIRCULATE. Starting chemical temperatures in the drums should be between 50°-75°F for both the A-Side & B-Side drums. Use IR thermometer or inlet temp gauge to measure drum temp (A-Side drum should NEVER be warmer than B-Side drum). If drum is below 50°F, then slowly raise temp with warming blanket or heated storage. NEVER super-heat with portable heater. If drum is too hot then blowing agent will boil-off.
Substrate Condition	Substrate must be clean, dry, and moisture content <19%. Substrate temp should be >5°F above dew point. When substrate temperature is below 45°F, pre-heat building may be necessary. When heating with portable heaters, if concrete or metal substrate only heat to 50°F, otherwise condensation may form. Never use portable propane heaters. When substrate temperatures vary, please refer to the processing parameters section (under substrate temperatures) for proper selection of foam grade.
Contamination	B-Side is sensitive to contamination from other products. Never combine this product with any other product and never combine open-cell with closed-cell products. Transfer pumps must be properly cleaned between product.
Spray Technique	Spray up-and-down approx 18" from surface. The further away you spray, the colder the chemical will be when reaching substrate. Layering will reduce yield, but make smoother. When substrate temp is below 35°F, may need ½" priming layer to improve adhesion.
Metal Concrete Applications	When applying on metal or concrete you may need a ½" priming layer. Increase temperatures by 2°-5°F to account for heat loss from these surfaces.
Max Pass Thickness	Max pass thickness is 3". If the foam is applied too hot or too thick, will overheat foam and cause burnt or "fishy" odor, result in future shrinkage, or possibly lead to fire hazard (including spontaneous combustion). 2nd layer may be applied after 1st layer is hard to the touch. Important: Core foam temp should never exceed 270°F.

PROCESSING INSTRUCTIONS (CONTINUED)

Temperature Settings

As a general rule of thumb, the hose temperature is the most important setting and should be set first. The A-Side is set 2°-5°F higher than the hose. The B-Side is set 2°-5°F higher than the A-Side.

High Altitude

At higher elevations, A-Side & B-Side temps may have to be set the same as the hose. Foam expands better at high elevation, be careful to control pass thickness.

Heated Hose

A poorly insulated hose may not be able to maintain adequate hose heat and drastically change required temp settings on primary heaters. Never Increase hose temp above 145°F, you can burn the hose.

Maximizing Yield | Dialing-In Temps

Dozens of factors affect yield, but properly dialing in temps and # of layers is critical. Ideal core temp should be 240°-260°F, this is the yield sweet spot (use a digital meat thermometer to test the core temp). DO NOT exceed 270°F. For experienced sprayers, start temperatures cold enough that the rising foam sags slightly, then increase temps 5°F at a time until sagging stops. Many thin layers will reduce yield significantly.

Pressure Settings

Mix pressure settings to the Gun for 01 mix chamber should be @ 1000 psi, for 02 @ 1200 psi. Higher fluid pressure settings create more mist and require greater distance from the cavity, resulting in more over spray. Higher pressure will generally lower yield. Air purge pressure set 80 - 100 psi.

TROUBLESHOOTING GUIDE

Delamination

If foam delaminates from substrate, it may be from cold substrate. Apply an initial 1/2" priming layer to improve adhesion. Another cause may be excess moisture in substrate; try reducing A-Side temps by 5°-7°F to reduce ISO reactivity. Spraying over uncured foam may also cause delamination.

Blistering

If foam creates voids and blisters behind foam, it may be from too much moisture in substrate. Apply a flash layer pass to the substrate, then apply regular pass as normal. IF spraying on metal and blisters form, try increasing thickness of initial pass (no less than 1/2").

Elongated Cell Structure

If the foam has stretched or elongated cells, then it is likely too hot. Try reducing all temps by 5°F.

Large Cell Structure

If the foam has consistently large cell structure, then the B-Side Resin may be contaminated with open-cell resin or contaminated or worn out mix chamber.

Crunchy or Gummy

If foam is crunchy and amber in color, then foam may be ISO rich and off-ratio. If "gummy" consistency, then foam may be resin rich. Check equipment. Cured foam should be snappy in consistency when broken apart.

Chalky | Brittle

Too hot. Lower all heaters by 5°-7°F. If problem does not resolve, lower temperature by another 5°F, and repeat.

Curing Too Fast

If the closed-cell is curing too fast, then it is too hot and could result in future cracking. Lower temperatures by 3°F or as needed.

Curing Too Slow

If the closed-cell is curing too slow, then it is too cold and you may see a narrow spray pattern. Raise temperatures by 5°-7°F or as needed.

Gun is Clogging Often

If the mixing chamber needs constant cleaning, then foam may be too hot. Lower temperatures by 3°-5°F or as needed. Also check gun air settings.

Poor Yield

Too Cold: substrate, process temp or too large mix chamber. If temperatures are dialed-in too cold, then lack of heat will generate poor chemical reactivity & poor yield (See "Drum Temperatures" & "Maximizing Yield" under Processing Instructions). Check chemical expiration.

Pulls Away From Studs

If pulls away or "shrinks" from studs over time, then foam was applied too hot, too thick, or second layer applied over hot foam.

Important

Minimum drum temperature of 50°F is necessary to bring viscosities of A-Side & B-Side in alignment to prevent off-ratio foam and increase yield; setting chemical temperatures above recommendations may result in B-Side frothing. If the B-Side drum is over 85°F, then the blowing agent may boil and cause imbalance pressure in proportioner.

Frothing

Patriot 200 HFO contains a dissolved blowing agent. If the B-Side drum is overheated or excessively agitated, the chemical may froth out. Using winter formula in summer temps may also contribute to frothing or imbalance pressure in proportioner.

Cautions and Recommendations

Patriot 200 HFO is designed for installation in most standard construction configurations using common materials such as, concrete, metal, and wood products. The foam should not be used when the continuous service temp of the substrate is >180°F. Foam plastic installed in walls or ceilings may present a fire hazard unless protected by an approved, fire-resistant thermal barrier with a finish rating of not less than 15 minutes as required by building codes. Rim joists/header areas in accordance with the IRC® and IBC®, may not require additional protection. Foam plastic must also be protected against ignition by code-approved materials in attics and crawl spaces or as code approved alternatives apply.

As with all SPF systems, improper application techniques should be avoided and any defective product replaced with properly installed materials. Examples of improper application techniques include but are not limited to, excessive application thickness, off-ratio material and spraying into or under rising liquid foam. Additionally, off-ratio materials can result in offensive odors that may not dissipate. It is the responsibility of the applicator to understand how their equipment works.

Job-site Warnings

Applicators should ensure the safety of the job-site and construction personnel. SPF Insulation is combustible and appropriate signs shall be posted warning that all "hot work" such as welding, soldering, and cutting with torches should not take place until a thermal barrier or approved equivalent is installed over any exposed polyurethane foam.

Contractors should communicate with other trades working in proximity to the spray application area. Appropriate warning signs at each entryway must be posted that clearly indicates that spray foam activity is taking place and proper respiratory protection is required to enter. Non SPF personnel and occupants should be vacated from the building during the application of SPF. Proper Ventilation during spraying and afterwards at minimum 10 Air changes per hour. Re-entry: Ventilate for 2 hours before personal protective

equipment is no longer required for trades and inspectors. Re-occupancy: After 24 hours of continuous ventilation, building may be reoccupied.

Health and Safety Information

Before working with this product, you must read and become familiar with available information, including the Safety Data Sheet (SDS), regarding the risks, proper use and safe handling. All contractors and applicators must use appropriate respiratory, skin and eye Personal Protective Equipment (PPE) when handling and processing spray foam systems.

Refer to the Center for the Polyurethanes Industries (CPI): "Guidance for Developing a Written Respiratory Protection Program", "Guidance on Best Practices for the Installation of Spray Polyurethane Foam", and "Spray Polyurethane Foam Product Stewardship Guidance". Available at www.spraypolyurethane.org and www.patriotfoam.com.

Shelf Life and Storage

Patriot 200 HFO has a shelf life of approximately 4 months from the date of manufacture when stored in original, unopened containers at 50°-75°F. This material should be stored in a secure location and never in direct sunlight. Storage temperatures above the recommended range will shorten shelf life.

Vapor Retarder

When installed at a minimum of 1.5-inch, Patriot 200 HFO is considered a Class II vapor retarder. Consult with local code officials for specific requirements. Climate zone tables are available in current IBC® and IRC® publications.



DISCLAIMER: Please read all information in the general guidelines, technical data sheets, application guide and safety data sheets (SDS) before applying material. Patriot Foam products are for Professional Use only and preferably applied by professionals who have prior experience with the Patriot Foam products or have undergone training in application of Patriot Foam products. Published Technical data and instructions are subject to change without notice. Contact your local Universal Polymers representative or visit our website for current technical data and instructions. All guidelines, recommendations, and instructions are provided as a guide only. The user assumes all responsibility for the use of the product. We do not suggest or guarantee that any hazards listed herein are the only ones that may exist. Neither seller nor manufacturer shall be liable to the buyer or any third party for any injury, loss or damage directly or indirectly resulting from use of, or inability to use, the product. Recommendations or statements, whether verbal or written, are made on the basis of information received from the user and are not intended to constitute a warranty or any other form of assurance. The user assumes all responsibility for the use of the product.