

## STAYCELL® 504 HFO SPRAY FOAM INSULATION

### DESCRIPTION:

**Staycell® 504** is a two-component, self-adhering, seamless, closed-cell, spray-applied polyurethane foam system. This product is formulated with highly insulating **HFO** blowing agents and is used to insulate building components such as roof decks, ceilings, walls, siding, structural steel and tanks to provide an integral air barrier / insulation / vapor retarder for building envelope assemblies.

The benefits of **Staycell® 504** include:

- Low GWP
- High R-Value
- High Yield
- Air Impermeable Insulation at ½"
- Class II Moisture Vapor Retarder @ 1"
- Fungal Resistant – Passed ASTM C1338
- Low VOC per CDPH Standard V 1.2, 2017

REACTIVITIES AVAILABLE	AMBIENT TEMPERATURE RANGE
REG	60°F+
FAST	40°F to 65°F

### TYPICAL PHYSICAL PROPERTIES<sup>(1)</sup>

PROPERTY	METHOD	VALUE
Density, core (pcf @ 2" lifts)	ASTM D 1622	1.7
Compressive Strength (psi)	ASTM D 1621	21
Tensile Strength (psi)	ASTM D 1623	62
Closed Cell Content (%)	ASTM D 6226	>90
Air Permeance (½" @ 75 Pa)	ASTM E 2178	0.001cfm/ft <sup>2</sup>
Surface Burning Characteristics		
Flame Spread	ASTM E 84	≤ 25
Smoke Developed	ASTM E 84	≤ 450
Potential Heat (Btu/ft <sup>2</sup> /inch)	NFPA 259	1,834
Max Service Temperature		180°F

Exposed spray polyurethane foam is sensitive to ultraviolet light (UV) and will change color over time depending on exposure but can be easily painted with latex paints to color match adjacent surfaces. Contact PSI for paint recommendations.

### R-VALUE AND WATER VAPOR PERMEABILITY<sup>(1)(2)</sup>

Thickness (inches)	R-value*** (°F·hr·ft <sup>2</sup> / Btu)	Moisture Vapor Permeance***
1	7.0	0.95
2	14	0.47
3	20	0.32
3.5	23	0.27
5.5	37	0.17
6	40	0.16
7	47	0.14
8	53	0.12
9.5	64	0.10

\*As with all insulating materials, the R-value will vary with age and use conditions.  
\*\*ASTM C 518  
\*\*\*ASTM E 96

For proper use of this material, refer to the Staycell® 504 technical data sheet, installation guide and any of the following codes or documents:

- 2012, 2015, 2018 and 2021 International Building Code, Chapter 26 or International Residential Code R316 & R806
- API Fire Safety Guidelines for Use of Rigid Polyurethane and Polyisocyanurate Foam Insulation in Building Construction (AX230)
- SPFA-126 Thermal and Ignition Barriers for the Spray Polyurethane Foam Industry

(1) These physical property values are typical for this material as applied at our development facility under controlled conditions. SPF performance and actual physical properties will vary with differences in application (i.e. ambient conditions, process equipment and settings, material throughput, etc.). As a result, these published properties should be used as guidelines solely for the purpose of evaluation. Physical property specifications should be determined from actual production material. The above data was collected from samples prepared using equipment configurations pertinent to lab conditions.

(2) The data chart shows the R-value of this insulation. "R" means resistance to heat flow. The higher the R-value, the greater the insulating power. Compare insulation R-values before you buy. There are other factors to consider. The amount of insulation will depend upon the climate, the type and size of the building. If you buy too much insulation it will cost you more than what you will save on fuel. To achieve proper R-values, it is essential that this insulation be installed properly.

Polyurethane products manufactured or produced from this liquid system may present a serious fire hazard if improperly used. The character and magnitude of any such hazard will depend on a broad range of factors, which are controlled and influenced by the manufacturing and production process, by the mode of application or installation and by the function and usage of the particular product. **Any flammability rating contained in this literature is not intended to reflect hazards presented by this or any other material under actual fire conditions. These ratings are used solely to measure and describe the product's response to heat and flame under controlled laboratory conditions.** Each person, firm or corporation engaged in the manufacture, production, application, installation or use of any polyurethane product must carefully determine whether there is a potential fire hazard associated with such product in a specific usage and whether such usage complies with the applicable building code.

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## STORAGE AND USE OF CHEMICALS:

Staycell® 504 should be between 65°F and 80°F for proper processing through the spray equipment. Chemicals shipped during winter or summer months may need extra time in moderate temperature storage to stabilize within the proper application range. Cold chemicals can cause poor mixing, pump cavitation or other process problems due to higher viscosity at lower temperatures. Storing chemicals above 90°F should be avoided as much as possible. Excessively warm chemicals should be cooled prior to opening the drums. Do not store in direct sunlight. Keep drums tightly closed when not in use and under dry air or nitrogen pressure of 2-3 psi after they have been opened. When properly stored, unopened drums of Staycell® 504 A-Isocyanate and Staycell® 504 B-Resin have a shelf life of 6 months.

## SAFE HANDLING OF LIQUID COMPONENTS:

Use caution in removing bungs from the container. Loosen the small bung first to allow any built-up vapor pressure to stabilize before completely removing. **B component will froth at elevated temperatures.** Avoid prolonged breathing of vapors. In case of chemical contact with eyes, flush with water for at least 15 minutes and get medical attention. For further information refer to [www.spraypolyurethane.org](http://www.spraypolyurethane.org), Resources box, "Health and Safety Product Stewardship Workbook for High-Pressure Application of SPF".

## APPLICATION GUIDELINES:

Staycell® 504 is suitable for application to most construction materials including wood, masonry, concrete, and metal. Application can be to the exterior or interior side of wall surfaces. Staycell® 504 should not be applied to surfaces that will be in contact with soil and intermittent contact with water. To ensure proper adhesion, all substrate surfaces should be dry, clean of dust or flaking surface rust, ice or frost. All metal surfaces must be free of oil, grease, etc. Uncoated metals may require a primer coat. No flammable chemicals, such as wasp and hornet sprays, should be sprayed in the area of the foam application 24 hours before the application. No such chemical should be sprayed after the foam application until the foam has cooled to room temperature.

## APPLICATION AROUND PLASTIC PIPES:

Staycell® 504 can be applied in contact with PVC, CPVC, ABS, PP-R and PEX plastic pipes under the following conditions: 1. The pipes must not be pressurized during the foam application. 2. The foam pass applied in contact with the pipe should not exceed 2" thick in order to prevent excessive exothermic heat at the pipe-to-foam interface. 3. Allow a two minute cooling period between each additional foam pass.

## APPLICATION AROUND ELECTRICAL WIRES:

Staycell® 504 can be applied in contact with electrical wires. Spray foam applicators must spray the foam in such a manner that the expanding foam does not stretch and distort the wires. Light gauge wires which will be encapsulated in the foam layer should have the foam installed behind the wires and allowed to cool prior to applying a top layer to cover the wire. Use a shallow lift of 3/4" of foam to cover the wire. Wait the required two minutes between passes when adding more foam thickness to achieve the desired R-value.

## APPLICATION PASS THICKNESS:

Spraying foam will generate heat. Foam which is applied too thick in single passes will increase temperatures which will degrade cell structure and not produce foam with optimum properties. In the most extreme case, Staycell® 504 can reach dangerously high temperatures inside the finished foam which can lead to splitting, charring, or even spontaneous combustion. The maximum pass thickness for Staycell® 504 is 4 inches with a 10 minute cooling time required before adding additional foam passes. Multiple layers can be applied to reach the desired R-value.

## VENTILATION OF SPRAY AREA:

Spraying foam will generate mist and fumes with a distinct odor. For interior applications the building area must be vented with fresh air to dissipate the odor. The amount of air flow and time for venting will vary based on each situation. A closed attic area may require fans to force air into and out of the space. An open building that does not have the doors and windows installed may have sufficient air flow to vent the odor fairly quickly. Reentry time for closed-in areas being vented with fans is typically about 24 hours. Other workers should remain out of the immediate area during this venting time period.

## EQUIPMENT AND COMPONENT RATIOS:

Staycell® 504 must be sprayed with plural component proportioning pump designed for polyurethane spray foam. The proportioning pump ratio is 1 to 1 by volume. The preheater and hose temperature should be set at 130-145°F to give a good pattern. Due to equipment variations, the application temperature settings may be adjusted to achieve a good spray pattern. For higher-pressure settings above 1,000 psi, temperature settings can be slightly lower.

## SURFACE APPLICATION TEMPERATURES & REACTIVITIES:

The surface receiving foam application should be between 40°F and 120°F when applying Staycell® 504. In this range the warmer the surface, the better the adhesion. When surface temperatures fall below 60°F, adhesion may be aided by applying a 1/4 inch flash coat followed by a full thickness pass while the flash coat is still warm but no longer tacky to the touch. Another technique to improve adhesion in stud wall assemblies is to apply a cant along the side of the stud before filling in the center of the stud bay.

## WEATHER PROTECTION OF FINISHED FOAM ON EXTERIOR APPLICATIONS:

The finished surface of sprayed polyurethane foam should be protected from adverse effects of ultraviolet (UV) rays of direct sunlight, which can cause dusting and discoloration. Protective coatings designed for use with polyurethane foam are available. On exterior applications where a veneer or cladding is to be installed, Staycell® 504 may be exposed to UV light for up to 6 months.

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While descriptions, designs, data and information contained herein are presented in good faith and believed to be accurate, they are provided for guidance only. Because many factors may affect processing or application/use, PSI recommends that the user determine suitability of the product for a particular purpose prior to use. No warranties of any kind, either expressed or implied, including warranties of merchantability or fitness for a particular purpose, are made regarding products described or designs, data or information set forth, or that the products, designs, data or information may be used without infringing the intellectual property rights of others. In no case shall the descriptions, information, data or designs provided be considered a part of PSI's terms and conditions of sale. Further, the descriptions, designs, data, and information furnished by PSI hereunder are given gratis and PSI assumes no obligation or liability for the description, designs, data or information given or results obtained, all such being given and accepted at the user's risk.

Warning: These products can be used to prepare a variety of polyurethane products. Polyurethanes are organic materials and must be considered combustible.

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## COMPLIANCE WITH INTERNATIONAL BUILDING CODES (IBC) AND INTERNATIONAL RESIDENTIAL CODES (IRC):

Staycell® 504 is listed, labeled and certified by QAI Laboratories in accordance with QAI Listing No. B1020-1 indicating Class A flame spread and smoke developed ratings per ASTM E-84 and is classified as an *Alternative Thermal Barrier Assembly* when covered with Staycell ONE STEP® 502 intumescent spray foam insulation as a result of passing the UL 1715 large-scale fire test prescribed in the Special Approval subsection of SECTION 2603 of the IBC and SECTION R316 of the IRC when installed exposed as described below. These assemblies are considered acceptable alternates to the ½" gypsum board prescriptive thermal barrier requirements.

The Staycell® HYBRID HFO System are also qualified *Alternative Thermal Barrier Assemblies* when installed in an exposed condition in accordance with ICC 1100-2019 Standard for Spray-Applied Polyurethane Foam Plastic Insulation and IAPMO/ANSI ES 1000-2020 Standard for Building Code Compliance of Spray-Applied Polyurethane Foam based on passing UL 1715.



## LISTING NO. B1020-1

### Staycell® 504 / Staycell ONE STEP® 502 HYBRID HFO Intumescent Spray Foam Insulation System

#### Fire performance in accordance with ASTM E-84:

##### Staycell® 504 spray foam insulation (base layer):

Tested thickness: 4 inches Flame spread index:  $\leq 25$  Smoke developed index:  $\leq 450$

##### Staycell ONE STEP® 502 intumescent spray foam insulation (exposed surface layer):

Tested thickness: 4 inches Flame spread index:  $\leq 25$  Smoke developed index:  $\leq 450$

#### Qualification as an *Alternative Thermal Barrier Assembly* when installed exposed; no thermal barrier or ignition barrier required based on compliance with UL1715 large-scale, enclosed-room fire test standard:

##### Exposed applications on walls only:

Assembly: Staycell® 504 base layer installed at nominal 3 inch or less thickness covered with nominal 1 inch thick Staycell ONE STEP® 502 as the exposed surface layer.

##### Exposed applications on the underside of roofs/floors/ceilings only:

Assembly: Staycell® 504 base layer installed at nominal 8 inch or less thickness covered with nominal ½ inch thick Staycell ONE STEP® 502 as the exposed surface layer.

The Staycell® HYBRID HFO System was fire tested separately for installation exposed on either walls only or the underside of ceilings/roofs only. AS A RESULT, IT IS NOT TO BE INSTALLED EXPOSED ON ENTIRE WALLS AND ENTIRE ROOFS/FLOORS/CEILINGS WHEN ADJACENT TO EACH OTHER. Contact PSI for tested wall/roof transition applications.

QAI Laboratories, Ltd. (QAI) is accredited by International Accreditation Services, Inc., a division of the International Code Council that publishes the International Building Code and International Residential Code. QAI is accredited for fire testing, quality control inspections of manufacturing facilities and certification of listed and labeled products in accordance with IAS Registration Nos. AA-723, TL-220 and PCA-119.



# STAYCELL® 504 HFO SPRAY FOAM INSULATION

TABLE 1

NFPA 285 COMPLYING EXTERIOR WALL ASSEMBLIES  
STAYCELL® 504 HFO SPRAY FOAM APPLIED IN WALL CAVITY

WALL COMPONENT	MATERIAL DESCRIPTION
Base Wall System – Use either: 1 with the interior, steel studs, minimum 3½-inch depth, minimum No. 20-gauge at a maximum of 24-inch on center with lateral bracing every 4 feet vertically, or 2 or 3	1 - 1 layer of 5/8-inch thick Type X exterior gypsum sheathing installed on the exterior side of the steel studs 2 - Concrete wall - minimum 2 inch thick 3 - Concrete masonry wall
Floor-Line Firestopping	4 lb/ft <sup>3</sup> mineral wool (e.g. Thermafiber) friction-fit in each wall stud cavity at each floor-line. Mineral wool is not required in stud cavities at floor-line when infill floor-line construction <sup>1</sup> is employed for exterior wall.
Cavity Insulation - Use either 1 or combination of 1 and 2	1 - Full cavity depth or less of Staycell® 504 HFO using sheathing, concrete or masonry as substrate and covering the width of the cavity and inside the stud flange. 2 - Any noncombustible insulation (if batts, can be either faced or unfaced)
Interior Gypsum Wallboard	1 - Minimum 5/8-inch thick Type X gypsum wallboard
Exterior Wall Covering – Use either 1, 2 or 3 with Note 4.	1 - Any non-combustible exterior wall covering material 2 - Any combustible exterior wall covering system that has successfully been tested in accordance with NFPA 285. 3 - Any combustible exterior wall covering system up to a maximum wall height of 40 feet above grade plane. If the combustible material is fire retardant treated wood, the maximum wall height can be 60 feet above grade plane. 4 - For base wall 2 or 3, a covering is optional but not required. Use an exterior wall covering as described in 1, 2 or 3 above.
Window/Door Perimeters	Framed as required for the base wall. Use No. 25-gauge (minimum) sheet steel for flashing area outside of the base wall.

<sup>1</sup>Infill stud wall construction refers to the condition where the stud framing of an exterior wall is interior to the floor line slab edges, effectively terminating the stud cavity at each floor-line and creating sectioned stud bays in between sequential floors.



# STAYCELL® 504 HFO SPRAY FOAM INSULATION

TABLE 2

NFPA 285 COMPLYING EXTERIOR WALL ASSEMBLIES

STAYCELL® 504 HFO SPRAY FOAM APPLIED TO EXTERIOR OF WALL ASSEMBLIES

WALL COMPONENT	MATERIAL DESCRIPTION
Base Wall System - Use either 1, 2 or 3	<p>1 - Concrete wall - minimum 2-inch thick</p> <p>2 - Concrete masonry wall</p> <p>3 - One layer of 5/8-inch thick Type X gypsum wallboard on the interior, installed over steel studs: minimum 3 3/4-inch depth, minimum 20-gauge at a maximum of 24 inches on center with lateral bracing every 4 feet vertically.</p>
Floor-Line Firestopping	4 lb/ft <sup>3</sup> mineral wool (e.g. Thermafiber) in each stud cavity and at each floor-line – attached with Z-clips or equivalent. Mineral wool is not required in stud cavities at floor-lines when infill stud-wall construction <sup>1</sup> is employed for exterior wall construction.
Cavity Insulation - Use either 1 or combination of 1 and 2	<p>1 - Full cavity depth or less of Staycell® 504 HFO using sheathing as substrate and covering the width of the cavity and inside the stud flange.</p> <p>2 - Any non-combustible insulation (if batts, may be faced or unfaced)</p>
Exterior Sheathing - Use either 1 or 2	<p>1 - 1/2-inch thick, exterior type gypsum sheathing</p> <p>2 - 5/8-inch thick, exterior type gypsum sheathing</p>
Exterior Insulation - Use either 1 or 2	<p>1 - None</p> <p>2 – Staycell® 504 HFO - Total thickness to be a maximum of nominal 4 inches.</p>
Exterior Wall Covering Use either 1, 2, 3, 4, 5 or 6	<p>1 - Brick - Standard nominal 4-inch thick, clay brick. Installed with brick veneer anchors - standard types - installed maximum 24 inches OC vertically on each stud. A maximum 2-inch air gap between exterior insulation and brick.</p> <p>2 - Stucco - Minimum 3/4-inch thick, exterior cement plaster and lath. The secondary water-resistive barrier (WRB) may be installed between the exterior insulation and the lath. The secondary WRB shall not be full-coverage asphalt or butyl-based self-adhered membranes.</p> <p>3 - Minimum 2-inch thick Limestone, natural stone, or minimum 1 1/2-inch thick cast artificial stone. Any standard non-open jointed installation technique such as shiplap, etc. may be used.</p> <p>4 - Terracotta Cladding – Use any terracotta cladding system in which the terracotta is a minimum of 1 1/4-inches thick. Any standard non-open-jointed installation technique such as shiplap, etc. may be used.</p> <p>5 - Minimum 1-inch thick, Clark Pacific glass-fiber-reinforced-concrete (GFRC) panels. Standard installation techniques may be used. Staycell® 504 HFO sprayed onto the interior face of the GFRC panel up to a maximum of 4 inches.</p> <p>6 - Minimum 1-inch thick, Gates Precast Litrer precast panels. Standard installation techniques may be used. Staycell® 504 HFO sprayed onto the interior face of the precast concrete panels up to a maximum of 4 inches.</p>
Window/Door Perimeters	Framed as required for the base wall. Use No. 25 gauge (minimum) sheet steel for flashing area outside of the base wall.

<sup>1</sup>Infill stud wall construction refers to the condition where the stud framing of an exterior wall is interior to the floor line slab edges, effectively terminating the stud cavity at each floor-line and creating sectioned stud bays in between sequential floors.