

## WHITE PAPER

# Polyurethane Sealants as a Rough Opening Flashing Membrane VS R-Guard FastFlash Silyl-Terminated Polymer

BY DAVE KIMBALL

**“FOR THE TIMES, THEY ARE A-CHANGIN’”** is a famous song lyric from Bob Dylan and aptly describes building science and the role of fluid-applied air barriers in construction today. Regarding fluid-applied flashing materials, we are seeing this take place right before our very eyes. However, as times change, some things remain the same. For example, some well-known sealant manufacturers today are “repositioning” their polyurethane sealants as fluid-applied flashing materials for air barrier applications. The problem is that while polyurethane sealants have some good properties, they just don’t have all of the correct properties for this application, especially when compared to the silyl-terminated polymer technology that was used to create the first fluid-applied products 15 years ago. In addition to having virtually zero performance history in air barrier applications, polyurethane sealants also bring a litany of inherent problems. We’ll discuss those in a bit.

The first fluid-applied products were created with the express purpose of finding a better way to weatherproof and seal a building envelope’s rough opening by Tatley-Grund, a notable restoration contractor in Seattle – development of these products would result in a permanent change the industry.

As a restoration contractor, Tatley-Grund found themselves continually repairing young failed buildings that had been detailed with peel & stick membranes. At that time, the only repair method was to use the same peel & stick products that caused the initial failures. This set them on a course to find something better for these applications and so they developed a “wish list” of product capabilities to seek out. Tatley-Grund contacted a few notable sealant manufacturers with their “wish list” but no one could fill their needs. They were, however, directed to a certain type of chemistry that could be harnessed for these requirements and a chemist with the background to help. From there, Building Envelope Innovations (BEI) was created to develop what is today known as FastFlash, and through a partnership with PROSOCO, this product is available across the U.S. and has been used on thousands of high-performing projects.

**THE TATLEY-GRUND PRODUCT “WISH LIST”** of performance characteristics for this new concept was:

- Fluid-applied (fits perfectly everywhere)
- Bonds to damp surfaces (because wet substrates are common in the real world)
- Adheres without primer (saves an application step and the wait for drying)
- 100% solids to avoid shrinkage (what is applied remains the same thickness upon cure)
- VOC-compliant (minimal odor contributing to the highest indoor air quality)
- Immediately waterproof (can withstand a rain event before cure)
- Opaque when target thickness is achieved (offers easy visual inspection)
- May be exposed for 12 months (necessary for any construction delays)
- Paintable/Compatible (can be used with most all other construction materials)
- Vapor-permeable (does not trap moisture which causes rot or mold issues)
- Reduces steps/saves time (apply & spread application that works on wet surfaces and requires no primer)
- Competitively priced (cannot be cost prohibitive)
- Easily repaired (just apply & spread new material over any damaged areas)
- Self-seals around fasteners (a must-have for air barrier continuity)

As you can see, these product capabilities were quite a tall order more than 15 years ago but today provide advancements that current building science needs and supports. Fast forward to today and you find there are many manufacturers that have realized the benefits of fluid-applied detailing materials, as there are currently more than 14 manufacturers offering this option in their air barrier lines. Some manufacturers are trying their hand at lesser versions of STP chemistries but others are repurposing old sealant technology for this application. The most concerning of which is the use of polyurethane sealants for fluid-applied flashing applications, as this chemistry was evaluated over 15 years ago and found to be lacking.

- Polyurethane sealants are NOT recommended for application to damp surfaces. Why? The isocyanate crosslinkers in polyurethane chemistry are extremely reactive with water, and as such, excessive water present during cure can change their chemistry, resulting in different cured rubber properties and the potential for adhesion issues.
- These products come with no mention of moisture vapor permeability, the absence of which means trapping moisture in the underlying substrate, which is never a good thing. Industry experience would suggest that polyurethanes, in general, have poor moisture vapor permeability.
- Polyurethane sealant literature states an upper service temperature of 180°F, which is problematic as temperatures inside a wall cavity and in the rough opening can reach 180°F and above in the summer time, even in Northern climates, and most of the year in warmer areas. FastFlash has a service temperature of 300°F.
- Immediately waterproof? Polyurethane sealant literature does not address this but we do know that exposure to liquid water during cure can affect the cured sealant properties.
- Polyurethane sealants typically state there is “no restriction” on UV exposure, yet the industry is VERY aware of the limited life of polyurethane sealant with UV exposure alone, and the degradation effects are only multiplied when heat and water are added into the mix.
- Polyurethane sealants may be VOC-compliant (depending on who is evaluating compliance and who is measuring the volatile content) but they are certainly not odor-free, which can be a real problem on restoration projects. Remember, it was the reaction of products of methyl isocyanate (similar to polyurethane sealant crosslinkers) with water that killed 8,000 people and injured 558,000 people in the Union Carbide disaster in Bhopal, India, in 1984.
- Polyurethane sealants typically note an installation temperature of 32°F to 100°F. The PROSOCO R-Guard line of silyl-terminated polymer products can be applied at temperatures well below 32°F. These products will not significantly cure until 32°F is reached, but it doesn't matter since they are immediately waterproof. It should also be noted that getting a polyurethane out of the cartridge or sausage at 32°F (unless you're using a hot box) is very difficult because they become very stiff at lower temperatures.
- Typical polyurethane sealant literature states a 2-hour tack-free time. Particularly in restoration, but even in new construction, this amount of time can be restrictive to productivity.
- Polyurethane sealant literature makes no mention of NFPA 285; however, PROSOCO R-Guard silyl-terminated polymer products have extensive documentation relative to this industry standard, and a complete report is available upon request.
- Opaque at target thickness for ease of inspection and quality control? This is not addressed with a polyurethane sealant as fluid-applied flashing but is not likely a problem since they are requiring 40 mils. Compared to the target thickness of 12-15 mils for PROSOCO R-Guard FastFlash, this 40-mil requirement (which will likely be thicker because general thought is “if a little is good, then a lot is better”) will begin to interfere with rough opening tolerances and other detailing. Wet mil gauges can help but they are unreliable on anything other than a perfectly flat surface. On the other hand, PROSOCO R-Guard FastFlash is applied to “opacity.” This means if you can see through it, then it is not thick enough and if you can't see through it, then you're good! Additionally, a sausage of polyurethane sealant at 40 mils will go approximately one-third as far as a sausage of FastFlash. If you were the applicator, which would you prefer?

- Polyurethane sealants make no claims to self-sealing capabilities, which is a critical component in real-world applications.
- Polyurethane sealants being used as fluid-applied flashing alternatives are touting multiple color options as an advantage. Why? Air barrier detailing treatments get buried in the wall, so what does color matter? In fact, having so many colors is a DISADVANTAGE from a quality control and inspection standpoint. Frankly, this is just further confirmation that a product has been taken off the shelf, with no new benefit to our industry and building science, and “repositioned” as an air barrier detailing product and fluid-applied flashing for rough opening treatments.
- Polyurethane sealants being “repositioned” as fluid-applied flashing materials for air barrier applications do not discuss performance history, because they do not have any. PROSOCO R-Guard FastFlash was pioneered over 15 years ago and has been used successfully around the country ever since. It comes with proven performance that goes back to the repair of a leaking condominium in Seattle, which was completed in 2005. This project was inspected by an independent consulting firm (with property owner approval, of course) in 2010 and again in 2015 to observe performance. A section of exterior façade was removed to observe performance and the repair assembly with FastFlash was performing perfectly. There is no manufacturer other than PROSOCO with the confidence and ability to provide this type of performance history.

In conclusion, there are many manufacturers jumping on the fluid-applied flashing bandwagon that PROSOCO/BEI pioneered many years ago. Some of them are repurposing old technology for this critically important scope of work but none of them have the performance history to support a quality application. It is in the interest of longevity, sustainability and building performance that you consider your products and their performance pedigree, and you should understand the difference between products that were created and designed for a specific application as opposed to others that are thrown out there as an afterthought. Please be careful what you read and fully understand what is being portrayed.



**DAVE KIMBALL**

#### **ABOUT THE AUTHOR**

After 34 years at a major silicone sealant company, Dave Kimball has retired and started anew with PROSOCO, Inc., as a Technical Specialist in the Building Envelope Group, covering the North Atlantic Region from his office in Long Island City, NY.

Kimball has consulted on such high-profile projects as the Pentagon, Wash. D.C.; the Transamerica Pyramid, San Francisco; and the One World Trade Center, New York City. With areas of expertise in weatherseal, structural glazing, and exterior coatings applications, he now focuses on the unique challenges presented by rough opening preparation and air and vapor barriers.

Along with belonging to the Sealant Waterproofing and Restoration (SWR) Institute, Kimball is also a member of standards testing organization ASTM International.