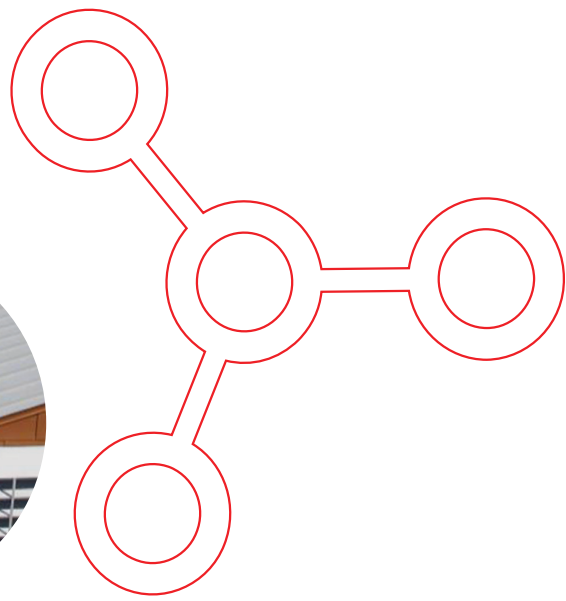
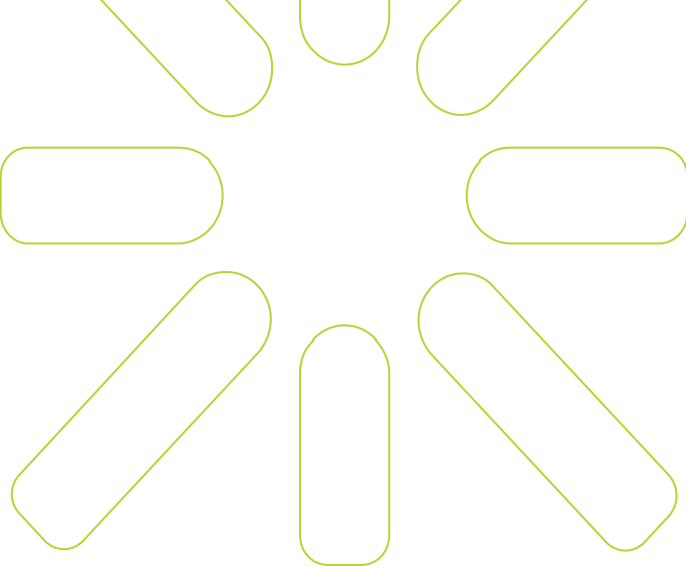


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Valspar Fluorpon® Extreme Coating: Evolution of Flagship Coating Delivers Field Ruggedness in a Smooth Finish

Product Paper



Overview

High-performance architectural coatings are used to deliver outstanding beauty and durability on monumental high-rise structures, pre-engineered buildings and high-end residential homes. These architectural coatings provide superior resistance to ultraviolet rays and other weathering elements so buildings continue to look beautiful for decades.

Valspar first introduced its flagship superior performance architectural coating more than 50 years ago when it launched Fluropon. Since then, premium fluoropolymer coatings containing 70% Polyvinylidene Fluoride (PVDF) have become the AAMA 2605 standard for superior-performance coatings.

As coating science has continued to advance over time, coil coaters and building contractors began asking coating manufacturers to enhance the abrasion resistance of high-performance architectural coatings. They wanted more protection against the inevitable wear and tear that occurs during manufacturing and installation with painted metal building panels, roofing and components.

Valspar scientists tackled this challenge. After several years of research, formulation and testing, that challenge has been solved with the Valspar Fluropon Extreme coating system, which provides all of the qualities of traditional Valspar Fluropon with increased damage resistance for the toughest projects. This article provides an overview of the latest advancements in damage resistance using the science of tribology to develop Fluropon Extreme.

History of Fluropon 70% Architectural Coating System

Fluropon® 70% PVDF Coil Coating is Valspar's flagship product for the architectural market. This solidly designed two-coat system has endured the test of time since being introduced 50 years ago. It set the standard for performance, long-lasting color and durability when it was launched and continues to be a leader in the industry. Fluropon is field-tested and time-proven to deliver enduring beauty. Fluropon coatings protect thousands of iconic buildings around the world...from the iconic Willis Tower (previously known as the Sears Tower) in Chicago to the shimmering, color-shifting Eser Residence in Woodland, California.

Valspar Fluropon provides superb protection against harsh outdoor elements including ultraviolet rays, dirt and stains, chemicals, heat, humidity and corrosion. PVDF has one of the strongest chemical bonds known and makes Fluropon resistant to many elements found in the environment including air pollution, acid rain and general airborne dirt.

All coatings within the Fluropon family are ideal for exterior use on roof and wall panels used on monumental structures; commercial, industrial and agricultural buildings; pre-engineered buildings; and high-end residential homes. In addition to strong performance in the field, these coatings all provide superior flexibility, formability and color consistency during the manufacturing process.

Since Fluropon was introduced, Valspar has continued to innovate. This leading coating system has evolved and grown over the years to offer a wide range of colors, sheens, gloss levels and special effects. For example, within the Valspar Fluropon Special Effects coating family, Kameleon delivers pearlescent hues with active color shifts. Nova creates rich colors with an intense silver or gold sparkle that has never been achieved until now. Rustica features natural and polychromatic colors with a weathered antique look. Valspar Fluropon is also available in a Solar Reflective (SR) formulation, delivering an eco-friendly way to resist heat absorption from the sun, lower energy cooling costs and keep buildings more comfortable. This coating meets all ENERGY STAR®, LEED® and CRRC performance requirements.



Turning to Resin System Performance for Potential Improvements

While 70% PVDF high-performance architectural coatings provide outstanding beauty and rugged weathering capabilities, they typically offer less abrasion resistance than non-PVDF coatings. Damage due to abrasion can occur on the loading dock, on the road while being transported, and on the job site during installation.

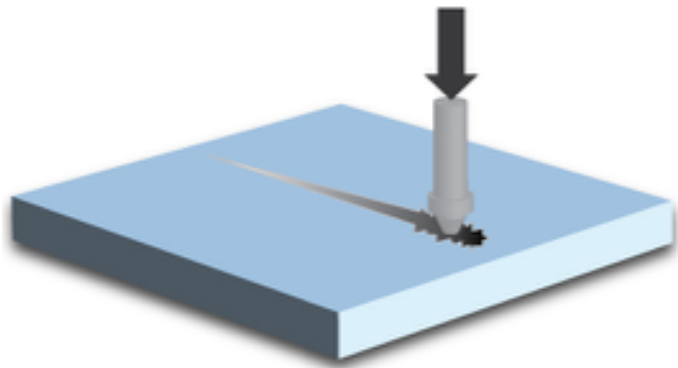
The base polymer is what determines, in part, the durability of a coating. The primary function of the polymer is to bind coating components together, and it is also an important source of a coating's durability and physical properties. The base polymer increases the physical strength and chemical resistance of the coating film, and plays a critical role in the paint curing process. When combined with high-performance pigments and additives, Fluropon PVDF coatings take advantage of the exceptional strength of the resin technology, providing the exterior durability the architectural industry has come to expect over the last 50 years but less abrasion resistance than non-PVDF coatings.

The ideal state in an enhanced 70% PVDF coating would be the creation of an ultra-performing resin that provided all of the durability characteristics and added damage resistance. For more than 20 years, coating manufacturers attempted without success to deliver on this customer need. Valspar scientists approached the challenge with a new innovative solution that made use of the science of tribology, the study of "wear." In simple terms, this scientific term covers the myriad of ways a coating can be damaged during forming, transportation, handling and installation.

Garnering Key Insights from Weather XL Coating Design

When Valspar's team of scientists set out to design a more "extreme" performing version of Valspar Fluropon, they turned to innovations already achieved in another coating line: Valspar WeatherXL coating. Valspar researchers had taken the science of damage resistance to a whole new level using tribology when they evolved the already rugged Valspar WeatherX coating into an even more rugged formulation in Valspar's WeatherXL, featuring a silicone-modified polyester (SMP) resin system.

After formulating the WeatherXL coating, Valspar scientists used rigorous, objective lab tests and customer field trials over several years to prove its superior damage performance against WeatherX coating.

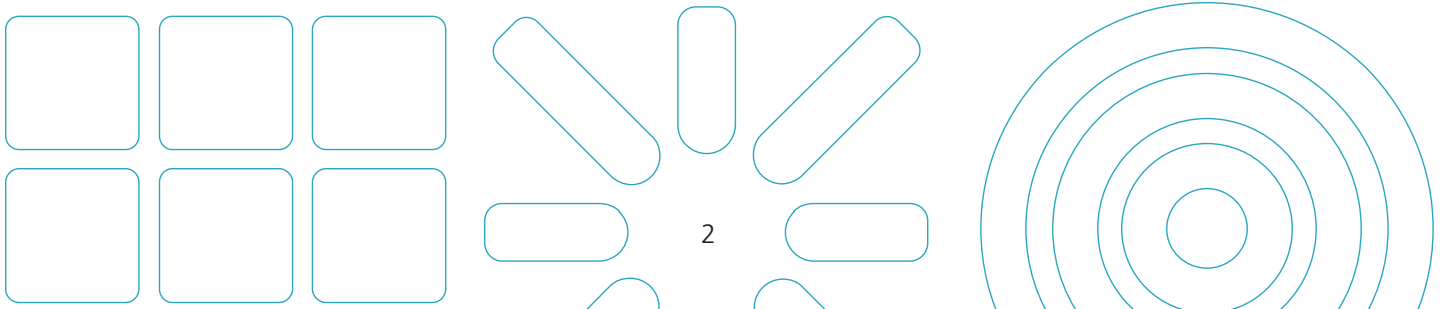


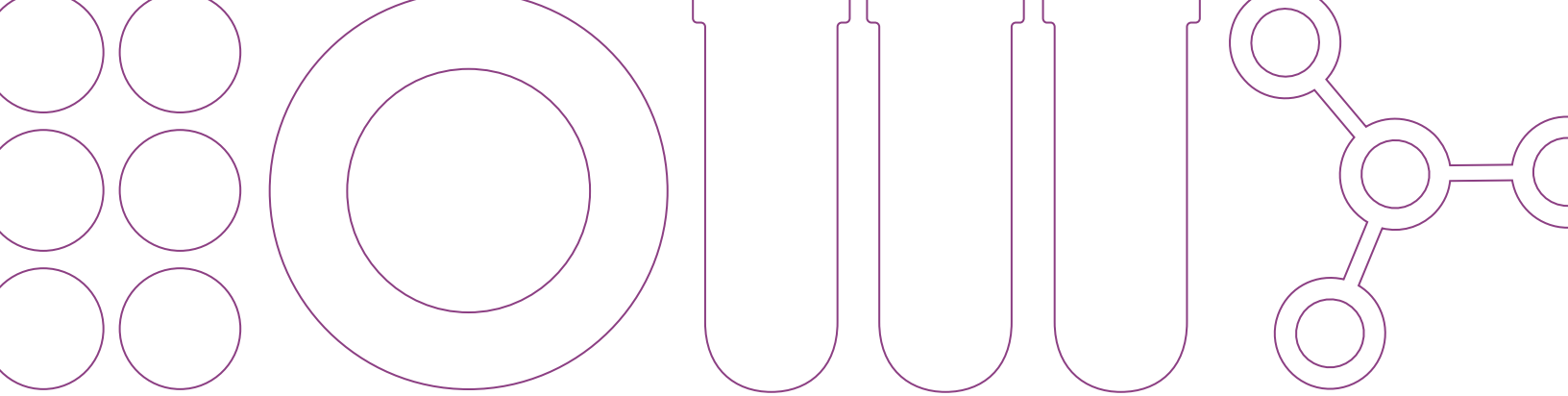
Micro Scratch Damage-Resistance Test

Valspar scientists used tribology testing to evaluate the damage-resistance of the new WeatherXL coating formulation. This objective testing is a proven methodology commonly used by researchers in many industries.

It uses a Micro Scratch Tester instrument to achieve repeatable, controlled damage compared to the non-scientific pencil test that has been historically used in the coatings industry to check for damage resistance.

The Result: Through detailed testing with the Micro Scratch Tester instrument, Valspar scientists validated that Valspar WeatherXL coating consistently demonstrated better damage resistance than WeatherX coating.





Multiple Coater and Customer Field Trials

Although scientific testing was important, validation from customers was critical for success. Several customers tested the coating on their products in the field to provide performance feedback.

The Result: Customers found that Weather XL delivered and proved much more resistant to damage than WeatherX.

Coater Trials #1 and #2

“New WeatherXL is more damage resistant than the existing product.”

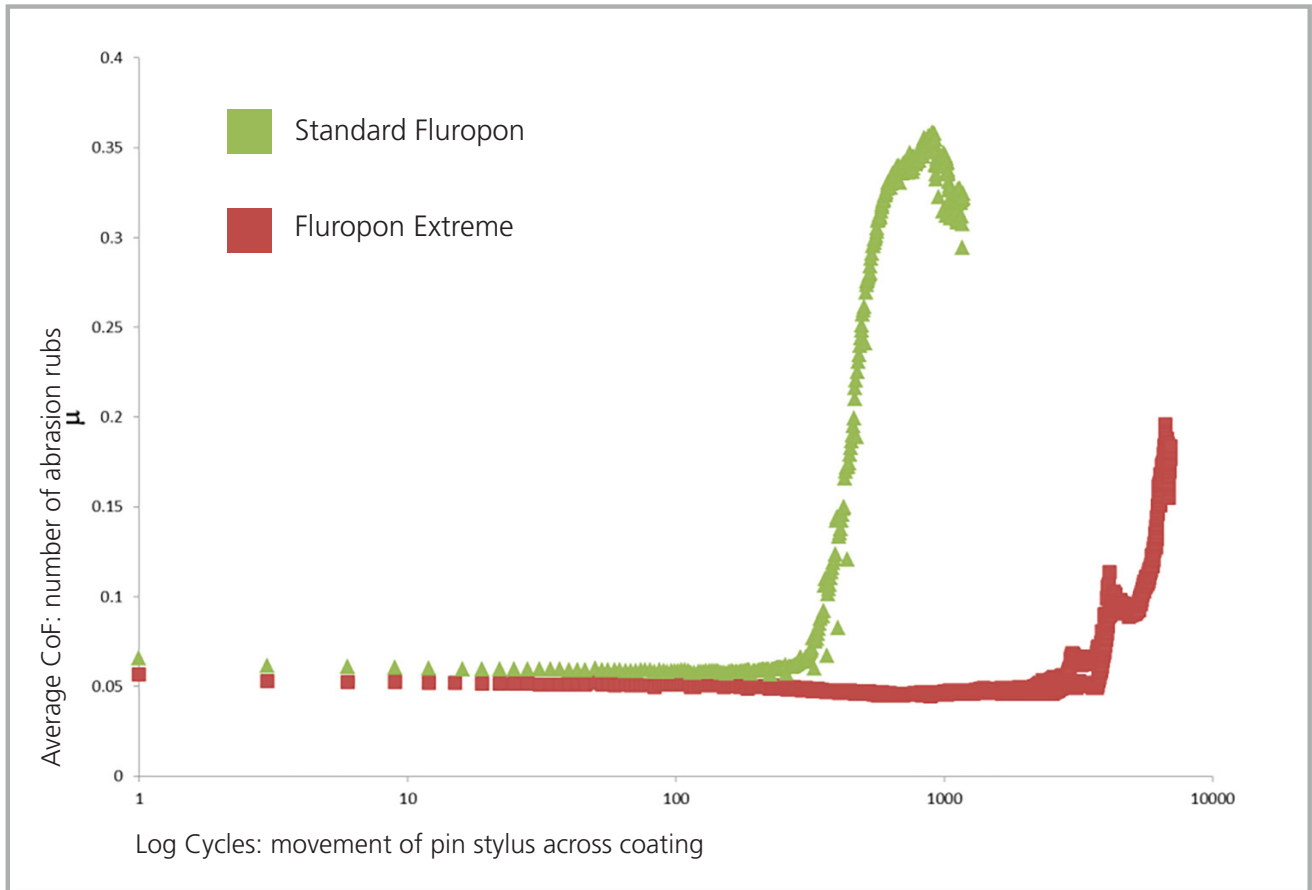
The Science of Abrasion Resistance: Tribology and Fluropon Extreme

Valspar scientists combined the key learnings from developing Valspar Weather XL using the science of tribology and abrasion resistance to develop Valspar’s new Fluropon Extreme coating. While customers said they wanted a “harder” coating, Valspar recognized that what they were really asking for was a more damage-resistant version of Valspar Fluropon coating to withstand a rigorous field environment.

The Valspar team set about to optimize wear properties of Fluropon coating for improved performance using experimental design to isolate factors that impacted the coating. They conducted work with the University of Florida’s Engineering Department, one of the world’s leading tribology experts, to design the coating parameters.

After several years of formulating, testing and refining the coating, Valspar scientists achieved what they set out to do. Their innovation with Fluropon Extreme builds on the history of this flagship product, delivering even more ruggedness in the field when it comes to damage resistance. They demonstrated in abrasion lab tests, Fluropon Extreme performs significantly better than a standard PVDF coating.

Abrasion Resistance Lab Study



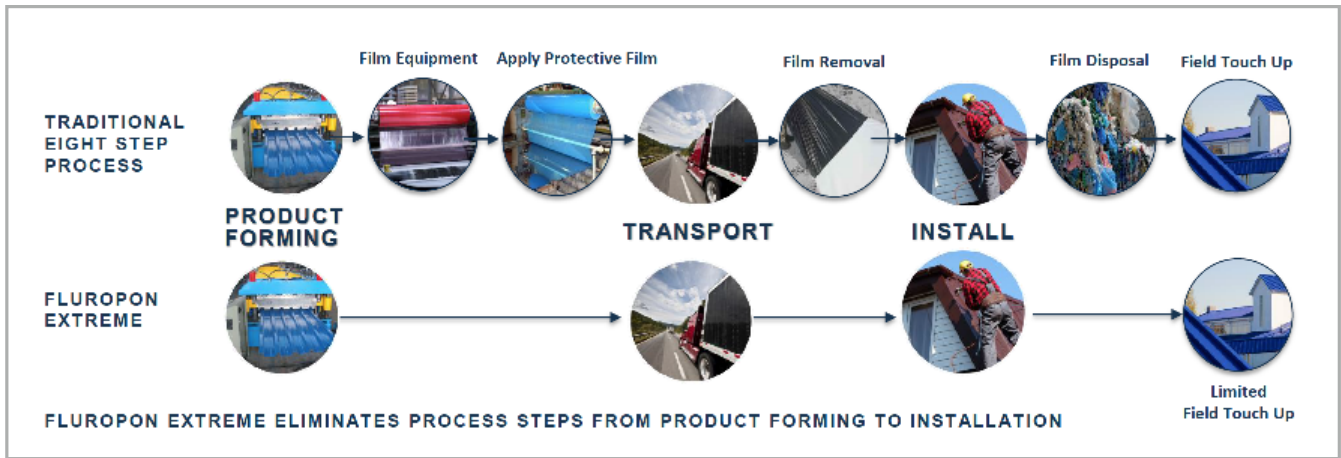
This abrasion resistance lab study demonstrates that Fluropon Extreme performs significantly better than the standard PVDF product.

Based on lab results, the team moved on to testing Fluropon Extreme in the field with customers. The type of stresses that coated metal panel and component are put under in the field can be significant.

Parts are typically stacked on trucks and transported to job sites. The metal-on-metal rubbing during transport can damage the panel. Most applicators use a protective film to prevent transport damage, which costs additional money and time. Once on the job site, metal panels are moved around, stepped on during installation, hoisted up onto the building and joined together in the seaming operation using hard metal tools and fasteners. All of these construction processes increase the chances of damage to the painted metal.

Results of field tests consistently confirmed that the new Fluropon Extreme coating was more damage resistant. When transported over the road on trucks, Fluropon Extreme coated metal panels showed no more wear than panels coated with Valspar Fluropon and a protective film. This improved field performance has allowed manufacturers to eliminate the use of protective film on metal components, saving time and money.

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By eliminating steps in the production process, Fluropon Extreme coating delivers total cost savings. Metal coaters do not have to apply a protective film to protect the finish during transport, which eliminates wrapping, removal and disposal of the film. For coaters that didn't use film, there is no need for coating touch-up of scratches that occurred during transit.

Summary

Valspar achieved its innovative goal with Fluropon Extreme high-performance architectural coating: delivering a highly desired smooth finish with enhanced damage resistance. Fluropon Extreme helps prevent the abrasion that can happen at key points in the process—the wear and tear that can occur during forming, transport and install. It saves time and money by eliminating the application and removal of protective film and reduces touch-up. Building on our Fluropon legacy, Fluropon Extreme continues to provide superior resistance to ultraviolet rays and other elements so buildings continue to look beautiful for decades.

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SOURCES:

Valspar Technical team

www.valsparcoilextrusion.com/en/index.html

University of Florida Engineering Department

AAMA Coating Specifications

ASTM testing standards



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