

Planes, Stains, and Automobiles:

# Stain Resistance on Flexible Vinyl Substrates

*How OEM's are Conquering Stain Protection with  
Lacquers on Vinyl Upholstery*

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S stain resistance on flexible vinyl substrates is a daily topic in the laboratory at APV Engineered Coatings. The type of stain resistance required varies by market and end-use. APV takes a customized approach to developing [primer and topcoat lacquer systems](#) that provide our customers with the performance properties they desire.

Airplane upholstery, automotive seating and mass transit fabrics are challenged with these unforgiving stains (think foods like coffee, mustard and ketchup to chemicals like cleaners, permanent marker and blue jean dye) challenging the longevity of the fabric in everyday use.

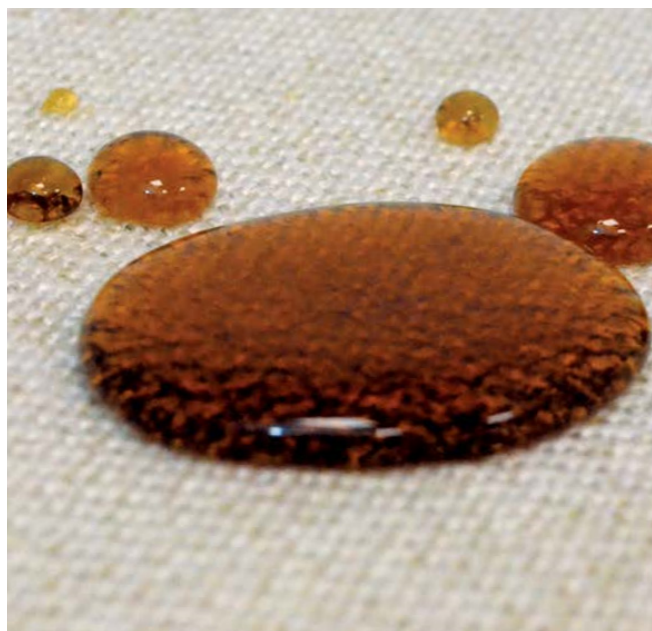


## The substrate-to-lacquer relationship

Whether they are cast or calendered, all flexible vinyl products are not the same. They will vary in their makeup based on:

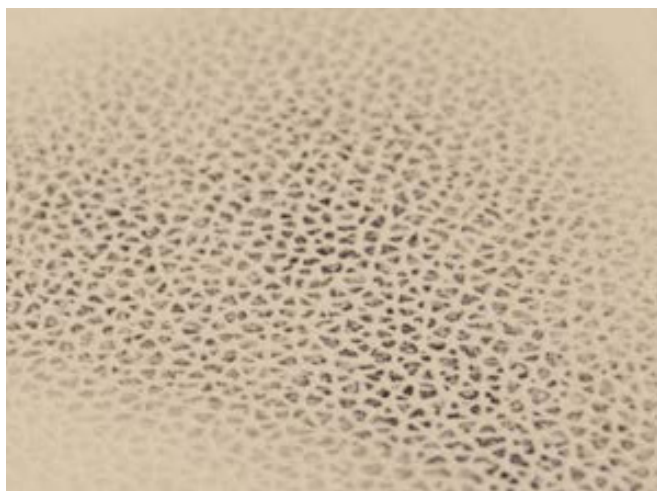
- Plasticizer type and concentration
- Pigmentation
- Fire retardants
- Heat stabilizers

The most important of these differences with regard to stain resistance is the type(s) and amount of plasticizer used in the manufacturing process. Plasticizers will migrate slowly out of the vinyl to become less flexible, changing the haptic (feel) of the fabric and most importantly, providing a pathway for stains to penetrate back into the topcoat and cause permanent stains in the fabric. Materials research and engineering are therefore critical for achieving the equilibrium between substrate and lacquer performance.



*Coffee stain beading up on fabric treated with a Vynguard® performance lacquer.*

"The most important factor in regard to stain resistance is the type(s) and amount of plasticizer used in the manufacturing process."



*Close-up of denim dye stain on PVC automotive upholstery.*

## Testing stain performance

How do you know how well a lacquer chemistry on flexible PVC performs against stains?

Stain resistance can be tested in a variety of industry-standard and rudimentary ways to identify the effectiveness of the finish. It's important to understand its initial effectiveness as well as lifecycle performance prior to commercializing a lacquer chemistry. It's also important to test the key stains the upholstery will undergo when in use.

The automotive OEM's have created their own test methods to evaluate a lacquer system's effectiveness in preventing the ingress of denim stains to the fabric. Some tests use dry denim and some with wet (water) denim and then evaluate the color change on the fabric. ASTM D4966-98 Martindale Abrasion Test is just one example of this type of stain test.

"The automotive OEM's have created their own test methods to evaluate a lacquer system's effectiveness in preventing the ingress of denim stains to the fabric."





## Conclusion

The industrial fabrics industry has consistently evolved into a performance-driven market where the lifecycle of commodity vinyl is being challenged and functional ingredients are coming under increased regulatory scrutiny.

A laboratory meeting about planes, trains and automobiles isn't just a movie reference at our manufacturing facility. Our technical team is always developing new approaches for novel and complex lacquer chemistries that work with vinyl to protect against some of the harshest stains in the environment. **Contact APV Engineered Coatings** today to inquire about your vinyl stain protection needs.