

# FOCUS

ON PU OR PVC FOR UPHOLSTERY

February 2015

## PU OR PVC FOR UPHOLSTERY

Which coated fabric is the better choice for upholstery, polyurethane (PU) or polyvinyl chloride (PVC)? The answer likely depends on design goals and the intended application. Both fabrics offer attractive solutions for a wide range of applications – from offices and break rooms to lobbies and auto interiors. ■ Each material is a composite of one or more layers of polymer coating or film bonded to a flexible substrate. Expanded vinyl is comprised of a knit fabric, a foam layer and a vinyl film layer. PVC's properties depend entirely on additives, which comprise more than half of the formulation. Modifications to the vinyl compound can be made right at the coating line. ■ PU coated fabrics are usually comprised of a woven or non-woven textile coated with one or more layers of PU. Some are saturated, or coated, with a layer of coagulated PU for breathability. Modifications to the polymer, however, must be made in a reactor or blender. ■ Each is engineered to meet the functional requirements of specific applications while providing the desired design and aesthetic appeal. In seating, both materials can be laminated to urethane foams for body and the desired compression resistance and rebound. ■ PU and PVC do have notable differences, particularly in terms of their appearance, performance properties in use, and price. Following are relevant characteristics to help you select the best fabric for the application.

### APPEARANCE

PVC offers great versatility and the chameleon-like ability to imitate almost any look. Simple compound modifications create simulations of leather or textiles, affording beautiful patterns, prints, textures, hand and body. By varying foam thickness, deep emboss and a more robust product is possible.

PU provides the most realistic imitation of leather with respect to hand, surface feel and overall aesthetics. It also “breaks” or wrinkles like real leather when gathered, stitched or tufted.

### PERFORMANCE PROPERTIES IN USE

PU upholstery, properly formulated, can remain soft and supple without cracking or peeling for its projected service life. It is lighter weight, many are breathable and can adapt to body temperatures very quickly. A naturally rubberlike polymer needing few additives, PU has high tensile strength, elongation, better recovery after stretch and performs well in low temperatures with little change in hand or flexibility. But unlike PVC, it is prone to puddling unless highly resilient underlying foams are added to return upholstery to its original shape when an occupant rises.

PVC offers a durable surface impervious to moisture, making it ideal for healthcare and marine environments and high traffic commercial seating. The fabric's knit back makes it easy to tailor and form rounded corners. PVC can also be thermoformed with four-way stretch fabrics to eliminate stitched seams that tend to harbor mold, mildew and bacteria, an especially important benefit for healthcare applications. Unlike PU, PVC will become firmer at low temperature and is slower to adapt to body temperatures.

### PRICE

While PU is far less costly than genuine leather, it's considered a relatively expensive polymer. The product's strength, however, allows it to be used effectively as a thin film, making the fabric lighter and thinner than a PVC product in the same application, and consuming less material.

PVC resin is comparatively inexpensive. Compound cost is ultimately determined by the cost of the additives, including plasticizers, heat and light stabilizers, fillers and flame retardants.

## OTHER ISSUES

### HYDROLYTIC STABILITY

PVC is not subject to hydrolysis to any significant degree. PU, however, when exposed to heat and humidity, can slowly de-polymerize, producing a flaking, brittle surface. Using high-grade resins such as polycarbonate ensures resistance to hydrolysis and extends the fabric's useful life. PUs that include blends of polyesters and polyester polycarbonates should be tested and/or certified to verify their hydrolytic stability. Caution: While polyethers are promoted as hydrolysis resistant, they are subject to oxidation, a different method of degradation.

### FLAME RETARDANT CAPABILITIES

PU offers limited flame retardant properties. These properties can be increased via polymer modification. PVC resin is inherently fire resistant, but meeting most fire codes and standards requires addition of varying types and quantities of flame retardants.

### THE USE OF TOPCOATS

Topcoats may be applied to PU for gloss control and surface feel. While topcoats for PVC provide gloss and surface feel, they also impart critical performance properties. Depending on the type of coating, they can enhance abrasion and stain resistance, surface cleanability and provide UV resistance. They can also improve mold and mildew resistance and effectively seal in plasticizers.

### RECYCLING

PVC is readily recyclable after consumer use; the product is routinely processed into roofing materials and other applications. Thermoplastic PU upholstery can theoretically be recycled after consumer use, although recovering such thin films is typically unfeasible.

Please consult the handy reference below for relevant product selection differences.

#### PVC AND PU SELECTION CRITERIA FOR UPHOLSTERY – GENERAL PROPERTIES & CONSIDERATION

Characteristic	PVC	PU
Polymeric based skin or coating	Yes	Yes
Able to laminate to urethane foams	Yes	Yes
<b>The Differences – A Guide For Product Selection</b>		
Appearance – Leather-like break	Good	Good
Variety of Colors, Grains, Textures	Excellent	Good
Tailorability - Initial seat build	Good	Good
Performance in Service	Excellent	Fair
Hydrolytic Stability	Excellent	Poor to Excellent - Based on formulation
Cleanability	Good	Good
Disinfectant	Good to Excellent	Fair
Resistance to Cleaners/Disinfectants	Good <sup>1</sup>	Fair <sup>2</sup>
Surface Temperature	Fair	Good
Flame Retardancy	As Specified	As Specified
Abrasion Resistance	Good	Excellent
Price	Medium	High
UV Stability	Excellent	Good
Design Flexibility	Excellent	Good
Environmental Performance		
Recycling Post Industrial	Good	Good
Recycling Post Consumer	Fair	Fair
Carbon Footprint	Nominal	Nominal

<sup>1</sup>Good with most cleaners but must be validated, properly diluted and rinsed following application.

<sup>2</sup>Fair – Must be validated, properly diluted and rinsed following application. Early failures have been encountered if cleaned with quaternary ammonium cleaners.