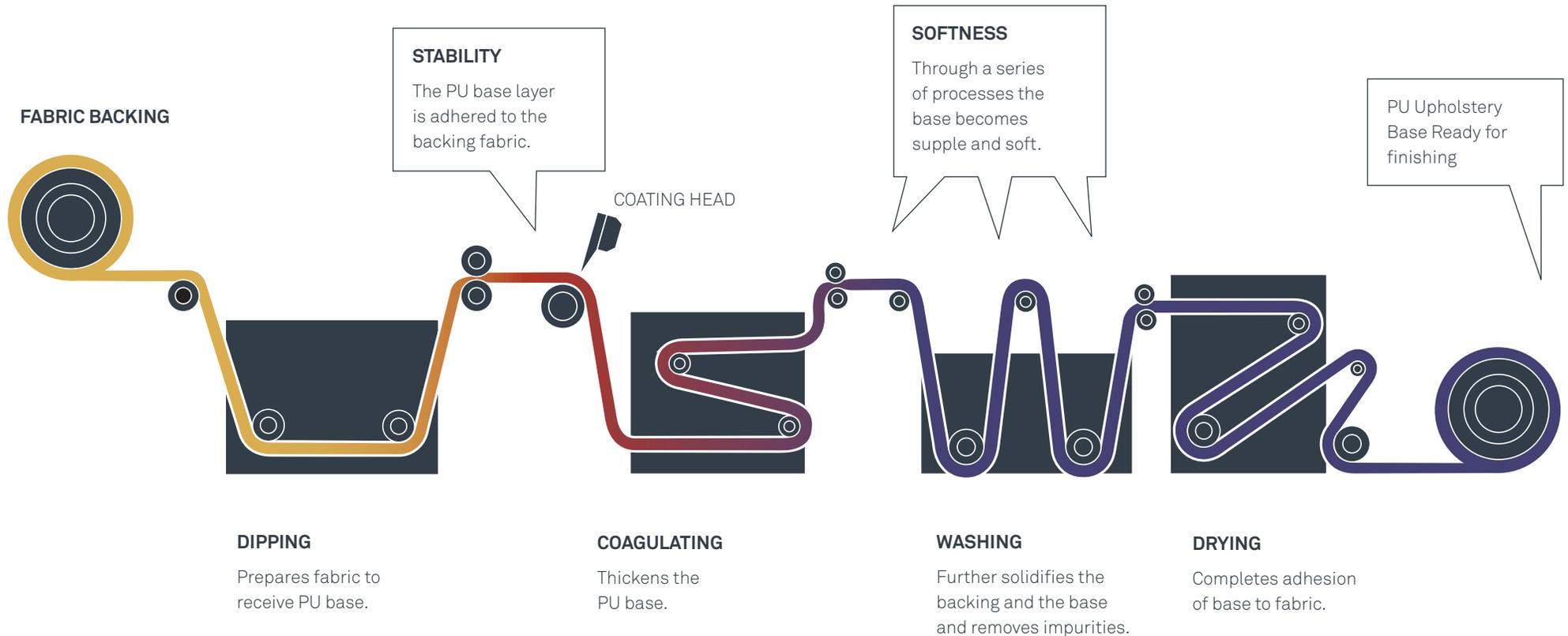


A GUIDE TO

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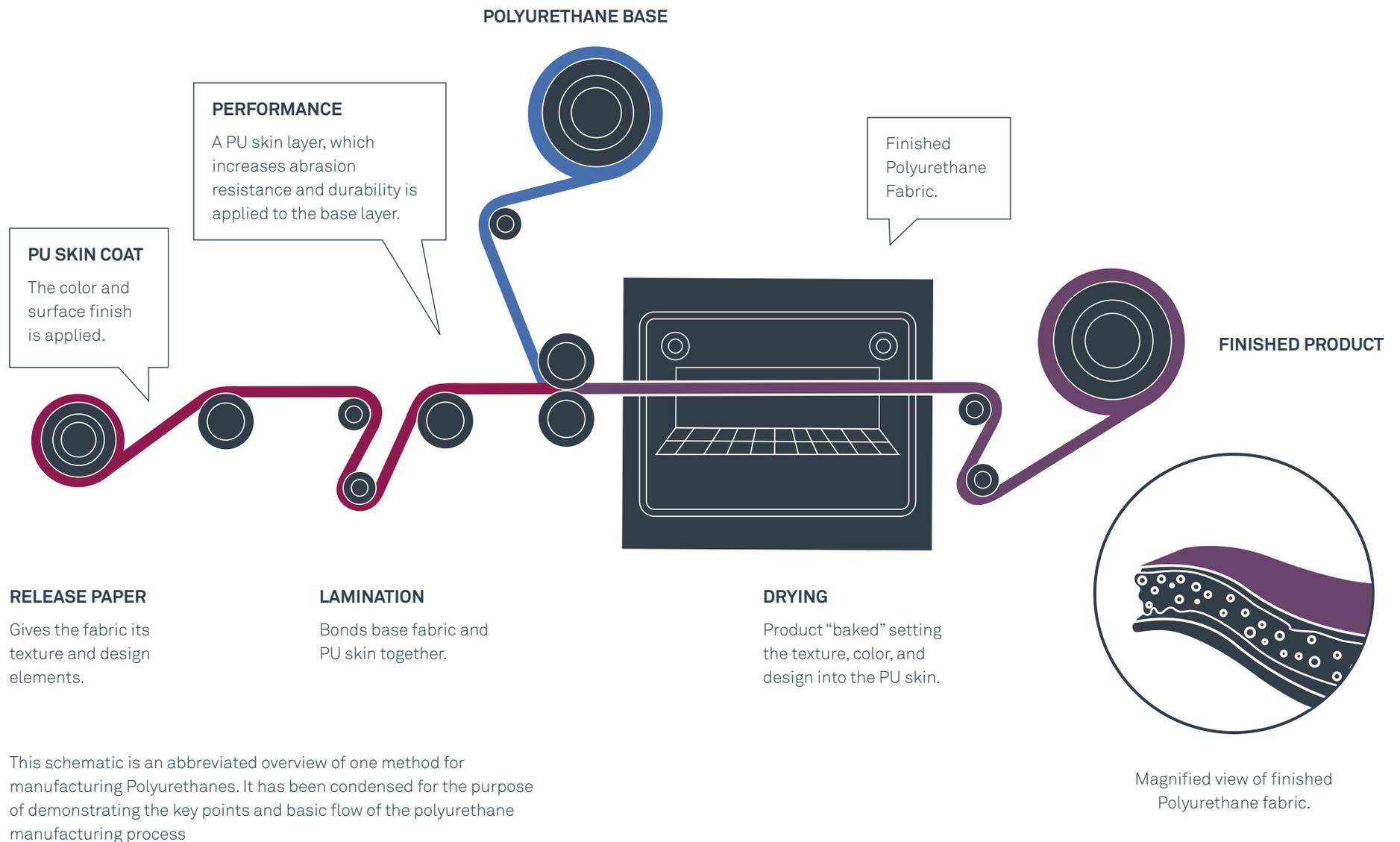
# High Performance Polyurethane Upholstery Fabrics

# Polyurethane Upholstery Fabric: How It's Made Phase 1

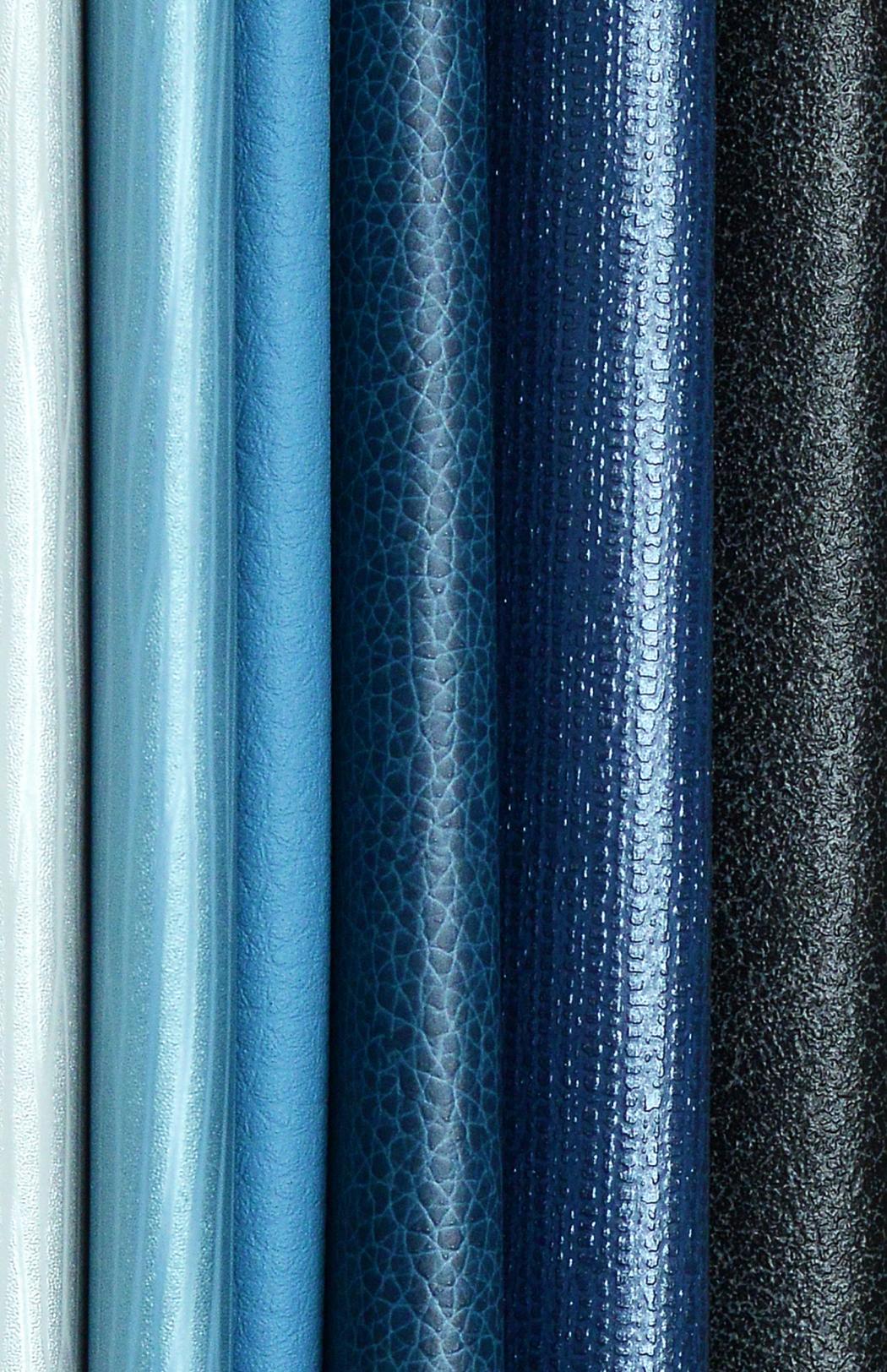


Polyurethane, commonly referred to as 'PU', is a polymer that is considered to be a highly resilient, flexible and durable material. PU is very versatile and can be manufactured in various forms - to be hard like fiberglass, spongy as upholstery foam, robust and protective when used as varnish, elastic like rubber, or very sticky as an adhesive. PU is becoming increasingly popular as an upholstery material, as it is PVC free and offers a combination of unique benefits including durability, suppleness, breathability, and an attractive appearance.

# Polyurethane Upholstery Fabric: How It's Made **Phase 2**



This schematic is an abbreviated overview of one method for manufacturing Polyurethanes. It has been condensed for the purpose of demonstrating the key points and basic flow of the polyurethane manufacturing process



## Why Use Polyurethane?

### PERFORMANCE

#### STRENGTH & DURABILITY

When using high grade resins, only a thin PU coating is needed to provide very high abrasion resistance and toughness.

#### STAIN RESISTANCE

Polyurethane made with high grade resins will provide very good inherent stain resistance. PU's with enhanced stain resistant technologies, such as Writer's Block, offer resistance to extreme stains like ink or indigo dye.

#### RESISTANCE TO CLEANERS

High Performance PU's with Cleangene technology offer resistance to many commonly used commercial cleaners and disinfectants as well as alcohol and diluted bleach. With proper maintenance (including a clean water rinse), the material will withstand repeating cleaning without becoming brittle or discoloring.

### COMFORT

#### SOFTNESS

Polyurethane provides for a soft, supple seating surface.

#### BREATHABILITY

PU's offer some breathability, whereas PVC based faux leathers do not.

#### TEMPERATURE CONTROL

High Grade PU's will remain cool on the surface, even after being sat on for long periods of time.

## What are the environmental benefits of PU?

### **Polyurethanes have several environmental advantages over PVC based faux leathers:**

- Polyurethane will decompose over time.
- Polyurethane can be incinerated, whereas other materials can release toxic compounds when burned.
- Polyurethanes typically contain lower levels of VOC's (Volatile Organic Compounds) than PVC based faux leathers.

The following are benefits specific to Resilience™, Writer's Block, and Cleangene branded PU's.

- Phthalate Free
- Lead & Heavy Metal Free
- BPA (Bisphenol A) Free
- Formaldehyde Free
- Do not contain Conflict Minerals
- Energy Efficient Production
- Water Efficient Production
- Water and Raw Materials used in production are reclaimed and recycled.





## What makes Polyurethane fabric suitable for contract use?

Not all Polyurethane upholstery fabrics are created equal. There are significant inherent performance differences between those made with lesser quality resins and higher quality ones. These differences can't necessarily be seen or felt.

The single most important factor in determining the quality of a PU is the type of resin that is used in both the formulation of in the skin and base. There are three basic categories of resin available:

### 1. POLYCARBONATE PU BASED MATERIAL

Higher cost, durable with high resistance to humidity, heat and light. Suitable for commercial upholstery applications. Will withstand 7+ Week Hydrolysis testing.

### 2. POLYETHER PU BASED MATERIAL

Mid-range cost, medium resistance to humidity, heat and light. Suitable for some commercial applications. Will withstand 3-5 Week Hydrolysis testing.

### 3. POLYESTER PU BASED MATERIAL

Low cost. Low resistance to humidity, heat and light. Not suitable for commercial upholstery. Will withstand 1-2 Week Hydrolysis testing.

The cost of the material is directly correlated to the quality of the resin and performance additives that are used in production to make a Polyurethane suitable for commercial use. It is important that both the base and the skin layer are made of high grade resin.

## What Is Hydrolysis And How Do We Determine Resistance To It?

Hydrolysis resistance is the single most important factor in determining if a PU is suitable for commercial seating applications. It is the process by which humidity and heat breaks down the cell structure of a Polyurethane, resulting in a flaking, brittle surface. Heat and humidity can act as the catalyst for the degradation of the material, but even in an air-conditioned indoor environment, body heat and sweat can over time be sufficient to break down a poor quality Polyurethane.

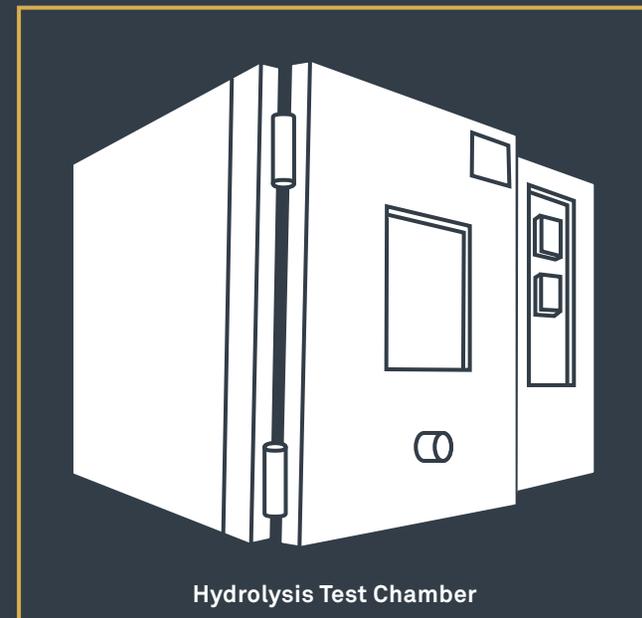
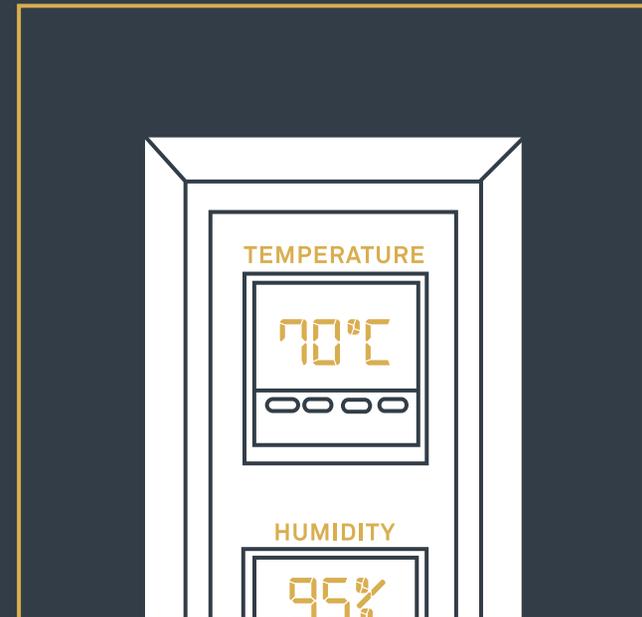
Using high grade resins, such as Polycarbonate, ensures lasting hydrolysis resistance, extending the useful life of an upholstery fabric. The test standard which is used to measure the hydrolysis resistance ISO 1419 (Tropical Test Method C) - commonly referred to as the Jungle Test.

In the Jungle Test a sample of the material is placed in a controlled air-oven & humidity apparatus. The material is subjected to relative humidity of 95% and a temperature of 70° C (158° F). The material is 'aged' for several weeks and compared to the control sample for degradation and various physical properties.

Note: The number of weeks of hydrolysis testing is sometimes referred to in years (e.g. 7 Year Hydrolysis) but there is no direct correlation of testing weeks to years of service in the field.

**The Association for Contract Textiles (ACT) recommends a minimum of 5 Week hydrolysis testing for a material to be considered suitable for commercial upholstery use.**

The photograph above shows a hydrolysis related failure of a low grade Polyurethane in a restaurant installation after 18 months of use.



# Contract Upholstery Material Comparison

	<b>PU</b>	<b>PVC</b>	<b>WOVEN TEXTILE</b>	<b>LEATHER</b>
<b>ABRASION RESISTANCE</b>	High	High with specialty coating	Ranges from low to high	High
<b>STAIN RESISTANCE</b>	Excellent inherent stain resistance	Requires specialty finish for good stain resistance	Poor to medium	Medium
<b>RESISTANCE TO CLEANERS &amp; DISINFECTANTS</b>	Yes, when using polycarbonate resins	Limited resistance with top coat only	Select fabrics/ yarns only	No
<b>BREATHABILITY</b>	Yes	No	Yes	Yes
<b>SEATING COMFORT</b>	Soft, comfortable	Traditionally firmer, tends to get hotter	Mostly comfortable	Comfortable
<b>COST</b>	Medium to high (Low cost qualities not contract grade)	Low to medium	All price levels	Very high
<b>ENVIRONMENTAL IMPACT</b>	Will degrade over time. Phthalate free. PVC free. Low VOC. Incinerable.	Does not decompose. Traditionally contains phthalates	Varies depending on type of fabric	Animal product. The tanning process often uses harmful chemicals and wastes water.

• This comparison chart reflects the typical properties of contract upholstery materials. There may be products available in each category that perform differently than outlined above.



## Tips For Upholstering With Polyurethanes

It is important to note that upholstery methods for Polyurethane differ from vinyl, but they can also differ from PU to PU based on the backing fabric used, resin quality, and weight of the material.

### **A FEW THINGS TO REMEMBER WHEN UPHOLSTERING WITH POLYURETHANE:**

Polyurethanes often stretch more than vinyl and, when upholstered improperly, may show a sagging or puddling effect. The following may assist in minimizing this:

- Always use good quality high density foam.
- Consider cutting the foam at least one inch oversize in both directions.
- Thick foam applications should have breathing holes to allow for quick foam recovery.
- Consider wrapping the foam to assist the backing fabric to slide freely over it, which will prevent the PU material from bunching up.
- It may be necessary to adjust sewing patterns that were use for vinyl or leather, to account for the increased stretch of Polyurethane. It is not recommended to railroad Polyurethane.

### **A FEW THINGS TO REMEMBER WHEN SEWING:**

- Avoid extreme folding of the material around tight corners or sharp radius' without foam backing support. This may place undue stress on the PU film creating a potential wear point, regardless of the abrasion rating.
- Due to its thin surface structure, Polyurethane is not recommended for use on welt cord.
- Consider using a minimum of six stitches per inch using a light ball tip needle.
- Avoid sewing polyurethanes with a top-stitch technique, as this may stress the PU skin.
- Consider double stitching key seam areas.

All manufacturing processes differ. These tips are offered as general helpful hints that should be considered prior to upholstering with Polyurethanes.

## Care and Cleaning

Polyurethanes made with polycarbonate resins are inherently very stain resistant. The best way to keep these materials looking great is to maintain them by cleaning regularly with soap and water. In the instance that stains or spills occur, wipe them and clean as quickly as possible.

For best results follow the instructions provided by the supplier for care and cleaning.

It is important that following any cleaning or disinfecting the material is cleaned with a fresh water wipe.



### EXCEPTIONAL STAIN RESISTANCE: INK, INDIGO DENIM AND CO.

For environments in which ultimate stain resistance matters most we recommend PU's with Writer's Block ink resistant technology. Writer's Block is a unique dual action - repel & release - stain inhibiting system that prevents ink, indigo denim dye and other stains from setting into the material and allows for easy cleaning. Writer's Block also protects against normally unbeatable stains including mustard, coffee, iodine, or blood.



### HEALTHCARE ENVIRONMENTS

For environments in which harsh cleaners/disinfectants are regularly used, we recommend PU's with Cleangene technology.

Cleangene features an advanced polymer system that offers the highest level of resistance to undiluted Isopropyl Alcohol, high concentrations of Bleach, as well as a variety of commonly used commercial cleaners and disinfectants. This proprietary non-toxic technology is inherent to the material makeup, so it will not dissipate or weaken over time. Cleangene will prolong the aesthetic beauty and performance of the upholstery in environments that are subjected to regular cleaning or disinfection.

## The Four Questions To Ask When Selecting A Polyurethane

### 1. WHAT TYPE OF RESIN IS IT MADE OF?

The resin dictates the performance of overall performance/quality of the material. If the product is being used in a contract, hospitality, healthcare or harsh environment a polycarbonate resin (in both the skin and base layer) is recommended.

**BEST ANSWER:** Polycarbonate

### 2. WHAT IS THE HYDROLYSIS RESISTANCE?

Hydrolysis resistance is the single most important performance characteristic of a PU. Polyurethanes being used in contract environments must have a minimum of 5 week hydrolysis resistance in both the skin and foam layer of the product. The Hydrolysis Resistance should be determined in the ISO 1419 Jungle Test.

**BEST ANSWER:** Minimum of 5 weeks Hydrolysis testing.

### 3. HOW CAN THE MATERIAL BE CLEANED?

Polyurethanes that are manufactured with Polycarbonate resins offer excellent stain resistance and excellent clean-ability. If required, they can be cleaned with a bleach or alcohol solution.

Polyurethanes with Writer's Block offer the highest level of stain resistance (including to ink and denim) and Polyurethanes with Cleangene technology offer the best resistance to cleaners and disinfectants.

**BEST ANSWER:** Diluted bleach or alcohol.

### 4. WHAT IS THE MINIMUM LIGHTFASTNESS REQUIRED FOR COMMERCIAL UPHOLSTERY?

Polyurethanes for commercial grade upholstery should have a minimum ultra violet resistance of 200 hours. Traditionally lower quality PU's only meet the residential standard of 40 hours.

**BEST ANSWER:** 200 Hours



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