PULPSTUDIO

PRODUCT REPORT

PINTURA™
Glass + Organic Color

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Pintura™ is a color coated glass product manufactured by Pulp Studio, Inc, and is ideally suited for commercial and residential spaces. Headquartered in Los Angeles California, Pulp Studio produces all of its Pintura™ products using the highest quality color coating and mixing systems. Our Pintura™ coating provides limitless color options with the highest durability and color consistency. Pintura™ is manufactured to the highest ASTM standards for coated materials and as a completely water based VOC free coating and environmentally friendly in the both application of the coating on the material, as well as the disposal of any waste materials.

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Pintura™ General Questions

There are many types of colored glass products, but what specifically is back-painted glass?

The term "back-painted glass" is a term used to describe glass that has been coated on one surface to be a completely opaque color, however this term is more commonly found in the North American market. The glass is also referred to as color coated, back-lacquered and sometimes misrepresented as spandrel glass.

Is back-painted, back-lacquered, color-coated and spandrel glass all the same?

No they are not. Back-painted and back-lacquered glass generally refer to glass products that are used for indoor installations, while color coating and spandrel generally refer to glass production applied to the exterior of a façade in the spandrel conditions of a building.

Are the qualities the same of these two glass categories?

No they are not. Due to the requirement of up close viewing the quality of the indoor glass products are critical, while the quality of glass on exteriors can generally have minor defects that are not always visible due to the viewer's proximity to the glass.

What creates the difference between these two categories?

The machinery used to apply the paint and the paint itself.

What are the different ways that paint can be applied to glass?

Curtain Coating – the glass runs underneath a curtain of paint. As the paint flows across the surface of the glass it finds its own level with the excess paint material pouring off the sides of the piece of glass being coated. The process is a high production system that is not considered a high quality finish for interiors. A typical characteristic of this process will be a series of rippled lines on the back of the coating caused by the paint not completely leveling off before the glass hits the drying oven allowing the paint to dry unevenly. This application is generally used for Spandrel glass.

Roller Coating – The process of running the glass through an application roller. The roller is coated with paint and the paint is applied to the glass in a continuous process. The quality is generally pretty smooth, but the process can create air bubbles in the paint as it is applied. If these air bubbles exist they can then pop when the paint is baked leaving what is referred to as pinholes in the color coating. These result in tiny clear spots created by the air particle trapped in the bubble prior to popping during drying.

Screen Printing - The use of a screen and a squeegee is also considered a traditional process of decorating glass with color, although for solid colored glass this process is slow and expensive. Screen-printing is generally reserved for the application of ceramic inks in decorative patterns; also know as ceramic frit, for exteriors installations where the durability of the color is critical.

Spray Coating – Using traditional equipment for color application such as robotic spray guns are the generally accepted process for the highest quality of color application. These spray guns are the same type used for automotive painting or commercial house painting. The primary difference when painting with robotic spray guns is the ability to control the amount of paint applied as the guns passes over the glass. Most applicators that use this process will actually spray multiple coats over the glass creating an even and consistent coating without the concern for air bubbles that can create clear pinholes. These spray systems can be done by hand or used in conjunction with automated conveyors, but total control of paint thickness can only be achieved with consistency using robotically controlled paint lines.

What about the paint itself? What type of paint used?

When the market of back-painted glass started to evolve, roughly ten years ago, we used what was available to us which were primarily automotive paints. All of these paints were solvent based and had decent adhesion to glass when the glass was sandblasted prior to coating. Unfortunately the thing that made these paints good in quality are the same things that made them bad for the environment. The VOC content of these paints soon became the target of environmental concerns and over time disappeared from the marketplace. Today in California, and soon across the country, we will see the entire color coating industry move away from solvent based, high VOC paint materials, and go to a market of only water based paints with no VOC content. The obvious benefit is our air quality and the environmental impact of the application and disposal of solvent based paints and residue.

There are also paints that are silicone based. The paint material is a low viscosity silicone that can be applied in various formats. The paint has relatively good adhesion to glass, but does not bond to the glass in the technical sense. In fact, any sharp object that comes in to contact with the painted surface will generally mar the surface of the paint. The traditional application for this paint is where the paint is exposed to high temperature conditions, such as in for spandrel panels where the silicone allows a high quality performance relative to the heat exposure it has to subjected too.

Do all solvent-based paints bond to the glass?

In fact most solvent based paint stick to the glass, but do not bond to the glass. Paints can stick to the glass, but ultimately peel off if enough force is applied. When paints bond to the glass there is chemistry created through additives that allow the paint to bond to the glass surface. In today's market there are still a significant amount of coated glass products that use solvent based paints in conjunction with after markets additives that create this bonding. These additives are typically only reliable when using solvents and as solvent based paint disappear from the market so will the quality of these painted products.

What type of paint does Pulp Studio use for the Pintura™?

Pulp Studio has been color coating glass since 1998. We are very proud of the fact that through our efforts were able to move away from solvents in early 2008 and changed our entire system over to a water based paint system. Our paint products branded under the name "Pintura™", have zero environmental impact and through continuous testing we able to create durable high performance color coatings with an effective system for color quality and repetition.

What makes the coating surface so durable?

Paint coatings are made up of liquid pigments and base. The base is made up of pigment and water (In the past this was past pigment and solvent). When the paint is applied to any surface it begins the process of drying and bonding to the surface it is applied too. The bonding is created through material specific additives that cause the paint to bond, but it is the evaporation of the water or solvent that causes the paint to dry. When the paint begins to dry it is the control of this evaporation process that creates the ultimate quality of the coating. Drying glass in ambient conditions can be affected by temperature and humidity. In some cases it can take days for a piece of coated glass to actually reach it surface strength due to the ambient drying conditions. In the case of Pintura™, the glass is baked after color application in controlled conditions that provide the ultimate coating quality and hardness.

Why is the hardness of the paint important?

One of the most critical requirements for the painted surface is its ability to be handled or fabricated after it has been applied without affecting the quality of the surface. In order to polish, cut or drill the glass after it is coated the glass coating must be cured 100% and at a maximum hardness to prevent chipping or separation of the coating.

Pintura™ products are 100% cured within 24 hours after application. As a result of this controlled cure all Pintura™ products can be cut, polished, drilled and laminated after the original coating process.

You mentioned something about adhesives and incompatibility, what is important to know about this area?

Paints are materials with sensitivity to other chemicals. This isn't just the case with glass, but any painted surface. There are hundreds of caustic elements that come into contact with painted surfaces every day from natural elements such as salt air to man-made caustic chemicals.

If you look at the contents of many sealants and adhesives you will find caustic additives, such as acids (solvents) that are used as the catalyzing element to harden these adhesives. These acids operate in much the same way as solvents do in paint. It is through their evaporation that causes the adhesive to harden.

When these acids based ingredients are part of the sealants and adhesive they can be aggressive and destructive to the color coated surface. In the case of glass these types of adhesives can cause the glass to discolor in the installation as you view the material in those areas where the adhesive makes contact with the glass.

Why type of adhesive should be used when applying Pintura™?

Pulp Studio recommends the use of only neutral cure silicones for the application of its glass products. The drawback to neutral cure adhesives is that they dry very slowly, so when glass is applied to a wall surface, it must also be supported while the sealant or adhesive dries. Neutral cure silicones dry through their absorption of moisture in the air, so curing times can vary based on the humidity of the conditions in the installation area. Check with the manufacturer of the product being used for drying time estimates.

Why is using a specific adhesive so important?

What most people don't realize is that when color coatings are applied to any surface they generally still allow a small percentage of light through the material, even when the color is considered 100% opaque. This condition exists with both light and dark colors, but is most evident in light colors. The condition exists because glass does not have 100% coverage of adhesive and in those gap where adhesive is not on the back surface of the glass there can be a light transmission through the glass of 2% to 10%. The light that travels through the glass can reflect and amplify off the wall condition behind it. If the adhesive color, or the pattern of application, is not done properly the small amount of light can actually create shadows around the adhesive itself.

What are the benefits to have a color coated surface that can be fabricated after the coating is applied to the glass?

There are many occasions where an installer has sufficient time to field measure a project and needs all of the glass cut to size and polished with factory accuracy; but there are also times where an installer does not have the benefit of time and may need to fabricate the glass in the field or local to the project. In these cases Pintura™ can be purchased in sheets and the installer can facilitate the fabricating in the field. This is not an unusual situation as back-painted glass is used in conditions very similar to mirror, and many installers are trained to provide these same services for mirror installations.

When using Pintura™ what type of glass is it coated on?

For many of our early years we would paint on any glass type. What we discovered over the years was that we were actually creating challenges for the future. The glass industry refers to standard float glass as "CLEAR GLASS'. Clear glass is not perfectly clear and in fact has a tint to it, which can range from very green to blue-green depending on where it comes from in the world. This green hue can be viewed as a contaminant to any color and when clear glass is used it is almost as if the color is being viewed through a tinted filter. What makes this even more subversive is that the tint of float glass can change from year to year even from the same manufacturer, so even when the glass is painted with the same color paint the final product may not end up matching when produced at different times.

As a result of this Pintura™ is only painted on low iron glass, which is a type of glass that has no discernible hue. Using low iron glass products allow us to insure that the final product produced will match from year to year.

Yes, but isn't low iron glass a lot more expensive?

It is true that low iron glass does cost a bit more, but in the long term there might actually be a costs savings. Insuring our ability to provide material for future repairs and additions that we know will match will ultimately save money. The high cost of trying to create a new color of paint to put onto a piece of clear glass to match old material can be a very expensive and frustrating process for everyone concerned.

What if I don't care about the challenge and want to paint on clear glass?

Pulp Studio will be happy to accommodate your request, but you and your client will be required to sign an agreement that you have been advised of the of the possible challenges you may face in the future of matching any replacement material.

What else do I need to know about the glass being used?

Our standard thickness for wall mounted Pintura™ is ¼" (6mm), although the process can be applied to any thickness or texture of glass. The most common issue that is of more concern is whether the glass must be tempered or can it be left annealed (not heat treated).

Many designers immediately assume the glass must be tempered in order to comply with traditional safety requirements or local building codes, and this is not an accurate assumption. These back-painted products are installed just like standard mirror and in general mirror is never heat-treated. The installation for both mirror and back-painted glass are the same as it relates to building codes. The code requires that these products are applied to the wall with specific adhesive patterns to insure if the material breaks that no piece of glass larger than a certain size can fall off the wall. It is critical that when Pintura™ is installed that these same requirements are followed by a qualified installer.

Why wouldn't I want the glass to be tempered, isn't it safer?

Yes, it is safer, but you must first understand something about tempered glass. The process of tempering glass can sometimes cause a small warp in the material. This warp is generally not a big issue when putting glass into frames or channels, but when you try to glue it flat to a wall it is an entirely different story. Since all wall-applied glass must line up along a wall condition, trying to make the glass install perfectly flat may turn into an adversarial exercise. The warp in the glass from tempering may make it impossible to get all the edges and corner to match up on wall conditions that are generally not flat in their original construction.

Is there any time where tempering the glass is beneficial?

In any condition where there is a need to have higher performing surface strength, such as tabletops, frameless doors or in exterior wall cladding.

Can Pintura™ be made with tempered glass?

Pintura™ coatings can be applied to any tempered, annealed, laminated or textured surface.

On laminated glass which surface is the paint on?

The painted surface can be applied to either the back of the glass, or be laminated to the inside of the lamination itself.

Does putting the color inside the glass change the tone of the color?

The laminating process can slightly change the tone of the color on one side when the color is placed inside the lamination, but this will become evident in the sampling process. Once the color sample is defined it will always be the same.

What are some examples where putting the color inside the lamination becomes beneficial?

When the product is used as opaque partition walls, wall cladding for elevator cabs, ceiling panels and frameless glass doors.

Are all Pintura™ products opaque colored paints?

The traditional products are opaque solid and metallic colors, but Pulp Studio has also introduced a new color shifting product called Chameleon and will ultimately be adding frosted and transparent color coatings.

Can Pintura™ be used with a Category II safety tape?

Although safety tape can be applied to the back of Pintura™, we do not recommend it unless there is a specific reason. Please consult your salesperson for application disclaimers and recommended applications for the tape.

Can I get Pintura™ in any color?

Pulp Studio matches and produces all of our own paint colors, so just about any color can be realized. There are standard colors that are always available and custom colors can be realized, although there may be a charge for matching them. Pulp Studio generally can match to any commercial paint color cards, Pantone® or RAL.

Pintura™ Performance Tests and Technical Information

Test	Results
Pencil hardness – ASTM D3363	4h - 5h
Cross hatch tape adhesion – ASTM D3359 method B	Good to Excellent
Solvent resistance → 200 double rubs	Methyl Ethyl Ketone (mek), Isopropyl Alcohol (ipa), Acetone, Lacquer thinner, Xylene
Acid resistance – spot test method under watch glass, 96 hours 5% Sulphuric and 5% Nitric	No effect
Effect of household chemicals – ASTM D 1308	96 hours, 5%
Effect of adhesives DOW Corning 955 Silicone structural sealant (white, black, grey) DOW Corning 999A silicone structural sealant (clear) DOW Corning 795 silicone structural sealant (white)	 No Effect No Effect No Effect
Adhesion Test Dow Corning 795 silicone structural sealant (white) 7 Day Cure Peel Strength (PLI)* Cohesive Failure 1 Day Water Immersion Peel Strength (PLI)* Cohesive Failure *PLI – Pounds per lineal inch	 44 100 50 100
Water Immersion in boiling water – 2 hours	No Effect
Water Immersion – room temperature – 1000 hours	No Effect
Ultraviolet accelerated weather – ASTM G53	UVB – 340nm lamps 1000 hours UV radiation continuous exposure.

Pintura™ Adhesion and Installation

Directions for use of silicone

1. Apply Pintura Wall Adhesive to the glass or substrate in a minimum of one (1) ping pong ball sized mound for every square foot (.0929 square meter) of glass. Do not apply the silicone too close to the edge of the glass to prevent "squeeze out". Place the mounds so that space will be left between them when the glass is installed.

2. Press glass firmly in place so that good contact is made between the glass, silicone, and substrate. The silicone should spread to an area approximately 4.5 inches (114mm) in diameter. Actual curing time will depend on temperature, humidity, type of substrate, and amount of air that can reach the silicone. Neutral silicone cures at a rate relative to the humidity and airflow levels of the environment of installation. In areas of high humidity the sealant can dry at a more rapid rate than dry ambient areas. Please use the manufacturer's recommended time frame as a guideline and maintain support for the material during the curing period.

3. Clean up can be done with mineral spirits.

4. For ceiling applications or technical questions please contact Pulp Studio at (310) 815-4999.

Directions for Substrate and Glass Preparation

1. Do not use on painted surfaces, wall covering, or treated wood.

2. For best adhesion, the glass, substrate and recommended sealant should be at room temperature (72°F, 22°C).

3. Make sure glass and substrate are free of dust, clean, and dry. On nonporous substrates, such as glass, tile, or metal, sealing is not necessary. On porous substrates, such as drywall or wood, use a primer or sealer (do not use paint) on the substrates and allow it to dry completely. Painted surfaces should be sanded through to the original surface and the substrate cleaned and sealed where adhesive is to be applied. Wall coverings should be removed and the substrate cleaned and sealed where adhesive is to be applied.

4. It is important to support the glass from the bottom during the curing process of the sealant for the manufacturer's recommended time period. Mechanical fasteners should be used for all glass applications, but not always required after the adhesive has cured.

At Pulp Studio we are dedicated to preserving the environment. We have strived to achieve developments in GREEN innovations in our offering of glass products wherever possible. In fact, we are the first in the industry to use a water based paint system for our Pintura™ product line that has zero VOC (Volatile Organic Compounds) content in the installed product. We are committed to developing products with environmental benefits, free of emission of hazardous materials and improve the environmental footprint of our products throughout their life cycle.

LEED® (Leadership in Energy and Environmental Design) guidelines have been created for architectural coatings to be used in their typical applications. Our products are always factory applied and therefore carry with them the further commitment of not only the compliance at site installation under LEED EQc4.1, but also compliancy when the coating is applied at the factory as well as the disposal of the unused paints and cleaning materials after application. The benefit of water based materials is their ability to be evaporated and disposed of with a minimal amount of environmental impact; where as a solvent based paint must be processed to prevent the VOC impact on the general air quality.

The coatings industry is filled with third party organizations that have established a set of guidelines that define what is considered a standard for compliance to be a GREEN coating product. Currently this standard is based on the U.S. Environmental Protection Agency (EPA) Reference Test * that a flat based coating material must comply with a VOC content of less than 50 g/L. We are proud to say that our Pintura™ coating is compliant with this standard and qualifies for LEED credits as a low-emitting coatings material for both commercial interiors and new construction.

Whenever the environment is important to you, and coated glass is a consideration, request that the project be built with Pintura™ back coated glass. A cradle to cradle approach of our coatings is a true commitment to the environment.

For more information, contact your salesperson.

* EPA reference test method 24 (Determination of Volatile Matter Content, Water Content, Density of Solids, and Weight Solids of Surface Coatings) Code of Federal Regulations, Title 40, Part 60, Appendix A

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