

DryWired® LumActiv® Product Line

Application Manual

Version 2.0.0 - Revised August 2018

Product Description

DryWired® LumActiv® is a patented, photocatalytic coating that breaks down volatile organic compounds (VOCs), odors, and number of airborne pollutants. In addition to its ISO-tested and proven air-cleaning capabilities, LumActiv® generates a hydrophilic, self-cleaning surface. LumActiv® combines photocatalytic TiO₂ and advances in nanotechnology to create the most advanced light-activated functional surface coating on the market.

Prior to Application

Product Selection

Four versions of LumActiv® are available for different applications. Below *Table 1* contains the product selection guide for different versions of LumActiv® and their suggested applications.

Product	Applications	How it's Different
LumActiv® Primer	Primer for organic surfaces, acting as an inorganic barrier	Inorganic TiO ₂ is non-reactive, creating a barrier between organic surfaces that could be broken down by photocatalytic TiO ₂ .
LumActiv® Multipurpose	Surfaces exposed to UV light, with the exception of glass	Most versatile form of LumActiv that is able to be applied to many surfaces.
LumActiv® Indoor	Interior surfaces exposed to mostly indoor light	Optimized TiO ₂ that reacts in the visible light range.
LumActiv® Glass	Glass, windows, solar panels, automotive glass, architectural glass	Optimized for glass; addition of a solvent to allow uniform application across the surface and silica to increase adhesion to glass.

Table 1. Product Selection Guide

If the surface is organic in nature and will be exposed to intense amounts of UV exposure or an extended period of UV exposure, LumActiv® Primer should be utilized.

Safety

Before handling any of the LumActiv® material, please review the safety data sheets associated with the material.

Calculating Volume

Once the version(s) of LumActiv® that are needed for the coating application have been selected, the volume of LumActiv® required for the project must be calculated. In order to do so, the total square footage of the project must be determined. Refer to the table below to determine the volume of LumActiv® required. *Table 2.* contains the estimated surface area that one (1) liter of the LumActiv® coating solution will cover based on a porous or hard surface. Keep in mind that porosity of a surface will vary. If a highly absorbent surface is to be coated, a layer of LumActiv® primer can be applied prior to the LumActiv® Multipurpose or LumActiv® Indoor to decrease the porosity of the underlying surface.

	LumActiv® Primer	LumActiv® Multipurpose	LumActiv® Glass	LumActiv® Indoor
	Coverage (ft ²)	Coverage (ft ²)	Coverage (ft ²)	Coverage (ft ²)
Coverage 1L Porous Surfaces	570	330	-	330
Coverage 1L Hard Surfaces	570	475	570	475

Table 2. Product Coverage Guide

Example:

The total area to be coated for a project is 25,750 square feet. The surface being coated is a semi-porous stone substrate. For this, it is projected LumActiv® Multipurpose is being used, and it is projected that 1L will cover 330 square feet. For this project, the company has decided to order an additional 10% of the projected volume.

$$\text{Total Square Footage} \times \frac{1L \text{ LumActiv}}{\text{Square Footage}} \times (1.00 + \text{Additional \%}) = \text{Order Quantity}$$

$$25,750ft^2 \times \frac{1L \text{ LumActiv}}{330ft^2} \times (1.00 + 0.10) = \text{Order Quantity}$$

$$25,750ft^2 \times \frac{1L \text{ LumActiv}}{330ft^2} \times (1.10) = \text{Order Quantity}$$

$$85.83L \text{ LumActiv} = \text{Order Quantity}$$

Equipment Selection

An HVLP (high-volume, low-pressure) spray gun is recommended for application of all versions of LumActiv®. It is recommended to calibrate the equipment using water to ensure solution compatibility and to test the spray pattern, ensuring the desired spray volume and coverage is achieved. LumActiv® Glass contains about 15% ethanol by weight and therefore has a lower surface tension. It is highly recommended to test your equipment for compatibility with the LumActiv® Glass solution to make sure there is no leaking of the solution. The lower surface tension of the 15% ethanol solution can cause significant leaking compared to that of water and the other completely water-based LumActiv®. The nozzle size recommended for application of LumActiv® Glass is smaller than the other versions of LumActiv® for this reason as well. Recommended nozzle size for LumActiv® Glass is 0.8mm. Recommended nozzle size for LumActiv® Primer, LumActiv® Multipurpose, and LumActiv® Indoor is 1.0mm - 1.3mm. A pressure of 30 psi (pounds per square inch) should be used when applying all versions LumActiv®. These details are outlined *Table 3.* below.

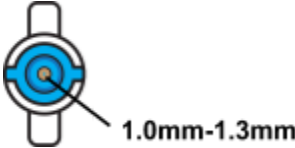

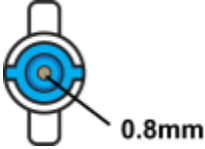

Equipment	
LumActiv® Multipurpose, LumActiv® Indoor, LumActiv® Primer	
	
Nozzle Size: 1.0-1.3mm	Pressure: 30 psi
LumActiv® Glass	
	
Nozzle Size: 0.8mm	Pressure: 30 psi

Table 3. Equipment Specification Guide

Surface Preparation

The recommended environmental conditions for application are 20% to 60% relative humidity for optimal drying time and appearance. A low humidity level can cause poor adhesion, which may diminish the photocatalytic effect. A high humidity level can cause uneven coating, which may diminish the photocatalytic effect. Surface preparation is key to achieve an evenly coated

surface. Porous surfaces should be power-washed without detergents as some detergents leave behind a hydrophobic (water-repelling) surface. For glass and other hard substrates, a surface degreaser without detergents, such as DryWired® Glass Cleaner, can be used. If glass is heavily soiled, a glass scraper may be necessary to thoroughly clean the surface. Hard surfaces should demonstrate hydrophilic properties when the surface has been sufficiently cleaned. A hydrophilic surface will show a water-sheeting effect. *Table 4.* depicts a hydrophobic surface that has been coated versus a hydrophilic surface that has been coated.

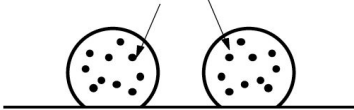
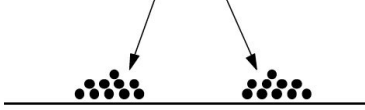

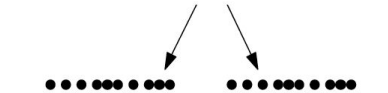
 <p style="text-align: center;">Hydrophobic Surface</p>	 <p style="text-align: center;">Dried Film on a Hydrophobic Surface</p>
 <p style="text-align: center;">Hydrophilic Surface</p>	 <p style="text-align: center;">Dried Film on a Hydrophilic Surface</p>

Table 4. Hydrophobic/Hydrophilic Film Application Depiction

In the case of an extremely hydrophobic surface, even after the surface has been thoroughly cleaned, it is recommended to add acrylic or urethane resin at 0.1% - 0.3% by weight in the LumActiv® Primer and LumActiv® solutions to obtain strong adhesion.

In all cases, immediately before application, ensure a completely dry surface.

Application

Measuring

The first step in the application process is to calculate and measure how much solution will be used for the project. This may be different than the order quantity calculated earlier as the project may be completed in phases, the order quantity may have considered multiple project locations, etc. The amount of solution the gravity cup of the HVLP Gun must be considered.



Figure 1. Gravity Cup Identification - HVLP Gun

If the gravity cup does not hold the amount of LumActiv® solution needed for the entire project, calculate the necessary amount of LumActiv® solution based on specific areas or structures

considering the limiting factor of the amount of solution the gravity cup can hold. Refer to *Table 5.*, which contains the estimated surface area that one (1) liter of the LumActiv® coating solution will cover. Keep in mind that porosity of a surface will vary. If a highly absorbent surface is to be coated, a layer of LumActiv® primer can be applied prior to the LumActiv® Multipurpose or LumActiv® Indoor to decrease the porosity of the underlying surface.

	LumActiv® Primer		LumActiv® Multipurpose		LumActiv® Glass		LumActiv® Indoor	
	Thickness (µm)	Coverage (ft²)	Thickness (µm)	Coverage (ft²)	Thickness (µm)	Coverage (ft²)	Thickness (µm)	Coverage (ft²)
Coverage 1L Porous Surfaces	0.10	570	0.17	330	-	-	0.17	330
Coverage 1L Hard Surfaces	0.10	570	0.12	475	0.10	570	0.12	475

Table 5. Product Coverage Guide with Assumed Thickness

Example:

The total area to be coated for a single-location project is 860 square feet. The surface being coated is a hard, glass surface. For this, it is projected LumActiv® Glass is being used, and it is projected that 1L will cover 570 square feet. For this project, the company has decided to order an additional 5% of the projected volume.

$$Total\ Square\ Footage \times \frac{1L\ LumActiv}{Square\ Footage} \times (1.00 + Additional\ \%) = Project\ Volume$$

$$860ft^2 \times \frac{1L\ LumActiv}{570ft^2} \times (1.00 + 0.05) = Project\ Volume$$

$$1.58L\ LumActiv = Project\ Volume$$

In this case, the gravity cup only holds 400ml of solution and the total amount of solution to be applied is 1,580ml. It is known that the gravity cup will need to be refilled multiple times. First, determine the minimum amount of times the gravity cup will need to be refilled.

$$\frac{Total\ LumActiv\ Solution}{Gravity\ Cup\ Capacity} = Minimum\ Refills$$

$$\frac{1580ml}{400ml} = Minimum\ Refills$$

$$3.95 = Minimum\ Refills$$

Knowing the gravity cup will need to be refilled four (4) times, the project should be broken up into at least four (4) different application areas. There are two ways this project can be

completed. The first, since there are four passes of product required, we can divide the total amount of solution to be applied per pass.

$$\frac{\text{Total LumActiv Solution}}{4 \text{ Passes}} = \text{LumActiv Solution Applied per Pass}$$

$$\frac{1580\text{ml}}{4 \text{ Passes}} = \text{LumActiv Solution Applied per Pass}$$

395ml LumActiv Solution Applied per Pass

The second way this case can be approached is based on the number of structures. Here, there are five (5) individual structures.

$$\frac{\text{Total LumActiv Solution}}{\text{Number of Structures}} = \text{LumActiv Solution Applied per Structure}$$

$$\frac{1580\text{ml}}{5 \text{ Structures}} = \text{LumActiv Solution Applied per Structure}$$

316ml LumActiv Solution Applied per Structure

In this case, there are two options for measuring the solution. The first option is to coat all the structures with the first pass, measuring 395ml for each pass. The second option is to fill the gravity cup one time for each structure, measuring 316 ml for fur (4) passes on each structure.

Once the solution has been measured for application, the coating process can begin.

Coating Process

The HVLP (high-volume, low-pressure) spray gun must be filled with the measured amount of LumActiv® solution. The HVLP gun should be held straight up and down, vertically at all times during application. The HVLP should not rotate at anytime during the application process. The HVLP should remain perpendicular to the substrate which is being coated. See *Figure 2*.

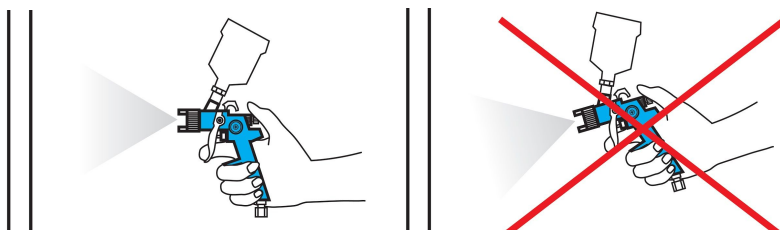


Figure 2. HVLP Spray Gun Orientation for Application

The tip of the HVLP nozzle should be 8-12 inches from the surface where the coating is being applied so that a fine mist is formed before the coating solution reaches the surface. This is represented in *Figure 3*. below.

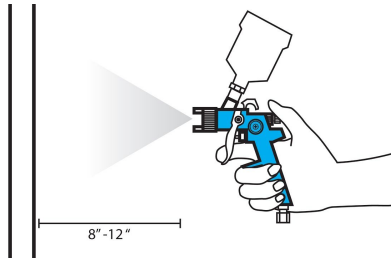


Figure 3. HVLP Spray Gun Distance from Substrate for Application

Four passes of the coating are necessary for completion of the coating application. Two of the passes should be in the vertical direction, and two of the passes should be in the horizontal direction. The reason for the suggested four passes is to avoid missing any spots on the substrate when coating and to ensure an evenly coated surface. If too much product is applied during the first two passes of a coating area, do not apply more than the recommended amount of coating solution. Move onto the next area to be coated and move the HVLP more rapidly during coating application to achieve the four passes.

The nozzle should be rotated during the change in direction of the coating application. When the coating is being applied in a vertical direction, the nozzle should be turned horizontally. When the nozzle is being applied in a horizontal direction, the nozzle should be turned vertically.

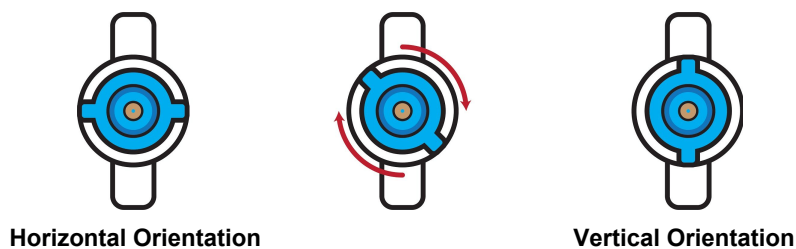


Figure 3. HVLP Nozzle Orientation for Application

It is recommended to wait ten (10) minutes between each pass in order to allow the coating to partially dry between passes. This ten minute drying time between passes will also avoid over application and visible running/droplets of the coating solution on the substrate. If the environmental conditions are favorable the time between coats can decrease. If the coating appears dry then 10 minutes between coats may not be necessary. *Table 6*. outlines the details of the four passes required for the LumActiv® application procedure.

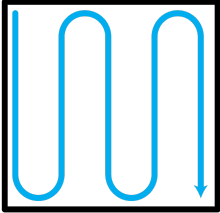





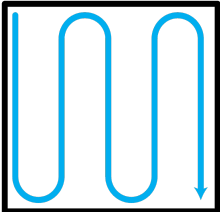




Coating Direction	Nozzle Direction	Time Between Coats
Pass #1		
		
Vertical	Horizontal	10 minutes or until appears dry
Pass #2		
		
Horizontal	Vertical	10 minutes or until appears dry
Pass #3		
		
Vertical	Horizontal	10 minutes or until appears dry
Pass #4		
		Coating application complete.
Horizontal	Vertical	

Table 6. Visual Application Guide, Four Passes

The coating application is now complete.

When it is necessary to use LumActiv® Primer, it should be applied similarly to the other LumActiv® products. The LumActiv® Primer requires only two passes; one vertical pass and one horizontal pass. The LumActiv® Primer must be completely dry before LumActiv® Multipurpose or LumActiv® Indoor is applied. Dry time of LumActiv® Primer is 1 to 3 hours and can be accelerated with heat.

Dry Time

3 to 12 hours are required for the film to fully dry should the coating be applied in the recommended environmental conditions. The film will dry faster at higher temperatures. The dry time can be accelerated with heat, so long as the temperature does not exceed 600°C. Once the coating has fully dried, the coating will not dissolve in water.

Cure Time

The coating will fully cure in about 2 months. At this point, the coating will have achieved maximum hardness (2H-5H depending on the coating/substrate). The cure time can be accelerated with heat, so long as the temperature does not exceed 600°C.

Storage

When stored according to recommended conditions outlined in the safety data sheets, shelf life is as follows:

- DryWired® LumActiv® Primer: 5 years.
- DryWired® LumActiv® Multipurpose: 5 years.
- DryWired® LumActiv® Indoor: 5 years.
- DryWired® LumActiv® Glass: 2 years.

Removal

Immediate removal of the coating can be accomplished by wiping with water and a cloth. If coating needs to be removed after drying, it is recommended to use DryWired® Glass Cleaner, or another abrasive glass cleaner like cerium oxide or aluminum oxide.

Clean-up

All tools can be rinsed with water immediately after use to remove any remaining coating solution. It is recommended to run water through the HVLP while still connected to the compressor before disassembling to rinse components.

Troubleshooting

Below, in *Table 7.*, are a list of possible scenarios which can be encountered when applying LumActiv® products. A list of solutions are available with the associated potential problems. If there are additional questions, please do not hesitate to reach out to the DryWired® Team by phone at +1-800-581-4528, by sending an email to sales@drywired.com, or by visiting our website at www.drywired.com/contact/.

Problem	Solution	Explanation
The LumActiv® applied is running and leaving streaks on the substrate.	<p><u>Hard Surfaces:</u> Remove LumActiv® with a wet, lint-free cloth before the solution has dried. The surface may need to be cleaned again. Allow the surface to dry. <u>Porous Surfaces:</u> Power wash the surface with water until the LumActiv® is completely washed away. Allow the surface to dry. <u>All Surfaces:</u> Reapply LumActiv® following recommended application procedure. Allow the recommended 8" - 12" distance between the HVLP spray nozzle and the substrate. Check the compressor is set to 30 psi. Ensure the correct spray nozzle is being used. Increase time between coats if environmental conditions are unfavorable.</p>	Applying an excess amount of LumActiv® will result in running of the product.
The LumActiv® has dried to a white film.	<p><u>Hard Surfaces:</u> Remove LumActiv® using DryWired® Glass Cleaner. Ensure a clean substrate. Allow the surface to dry. <u>Porous Surfaces:</u> Power wash the surface with water until the LumActiv® is completely washed away. Allow the surface to dry. <u>All Surfaces:</u> Reapply LumActiv® following recommended application procedure. Allow the recommended 8" - 12" distance between the HVLP spray nozzle and the substrate. Check the compressor is set to 30 psi. Ensure the correct spray nozzle is being used.</p>	Applying an excess amount of LumActiv® will result in a white film due to the build up of TiO ₂ .
The finished glass surface does not exhibit hydrophilic/self-cleaning properties.	Remove LumActiv® using DryWired® Glass Cleaner. Examine glass substrate for cleanliness and ensure the surface is free of all oils/grease. A glass scraper may be needed to clean the surface. Pay special attention to edges and corners. Reapply	Oil and grease residue on surface is hydrophobic and can inhibit the hydrophilic/self-cleaning properties of the

	LumActiv® following recommended application procedure.	LumActiv® Glass coating.
The LumActiv® Glass leaves a slight “rainbow” appearance on the glass surface.	Remove LumActiv® using DryWired® Glass Cleaner. Ensure a clean substrate. Allow the surface to dry. Reapply LumActiv® following recommended application procedure. Allow the recommended 8” - 12” distance between the HVLP spray nozzle and the substrate. Check the compressor is set to 30 psi. Ensure the 0.8mm spray nozzle is being used. Increase time between coats if environmental conditions are unfavorable.	Large droplets of LumActiv® Glass form a “rainbow” appearance when dried. Correct application will prohibit large droplets from forming.
The HVLP spray nozzle exhibits an uneven flow and is causing coating imperfections.	Check hose for blockages and leaks. Issues and solutions can vary between individual sprayers. Refer to the HVLP sprayer product documentation for troubleshooting instructions specific to your equipment.	Old product residue can build up if equipment is not cleaned properly. Other issues refer to troubleshooting guide specific to your piece of equipment.

Table 7. Troubleshooting Guide

All statements, technical information and recommendations contained in this document are based upon tests or experience that DryWired believes are reliable. However, many factors beyond DryWired’s control can affect the use and performance of a DryWired product in a particular application, including the conditions under which the product is stored or used and the time and environmental conditions in which the product is expected to perform. Since these factors are uniquely within the user’s knowledge and control, it is essential that the user evaluate the DryWired product to determine whether it is fit for a particular purpose and suitable for the user’s method of application. No warranty or condition, expressed or implied, is given regarding the accuracy of the statements, technical information or recommendations contained in this document. Except to the extent prohibited by law, DryWired will not be liable for any losses or damages arising in any way from the DryWired product including, without limitation, any direct, indirect, special, incidental or consequential damages, regardless of the legal theory asserted, including warranty, contract, negligence or strict liability. For questions, contact DryWired, LLC at +1-800-581-4528.