



## WR-155 Epoxy Primer WR-LPU Topcoat Description & Application Guide

### INTRODUCTION

System Three manufactures a waterborne two-part epoxy primer and a linear polyurethane topcoat. Since these products thin and clean up with water they are less hazardous and less costly to use than their solvent-containing cousins. Because they are non-combustible they can be used where flammable solvent-based paints cannot. Once cured, the combination is water and chemical-resistant, and will offer maximum protection from sun and weather, for watercraft and many other projects. The primer has corrosion-resistance properties, while the topcoat contains ultra-violet light absorbers, to give it extra durability. Used as a clear finish without the primer, it can beautify and protect wood from discoloration and degradation.

Although the System Three paint products thin with water, they apply much differently from architectural latex paints. With a little practice however, professional-looking results can be achieved by the non-professional applicator. This brochure will attempt to get new user acquainted with what he or she can expect from the products. For a low-cost introduction to trying the material, System Three offers The Paint Trial kit, available through your dealer or direct from the factory. It contains 1/4 pints of the primer and topcoat, clear and white, to give you an idea of how it looks and feels both wet and dry.

### DESCRIPTION

#### WR-155 Epoxy Primer

WR-155 Primer is a high-build, waterborne, two-part epoxy coating specifically formulated as a sandable base for System Three® LPU topcoat. WR-155 may be used over polyester or epoxy resin surfaces, and properly prepared wood, metal, and cementitious surfaces. It will provide performance equal to its solvent-borne counterparts, in corrosion protection, film-build, and sandability. In addition, it is non-flammable and contains no highly-hazardous(HAPS) solvents or heavy metals. It consists of an epoxy resin, called the Activator, and a hardener, called the Paint Base. When you mix them they form an oil-in-water emulsion. As the emulsion forms the material thickens. When cured, it will present a uniform, easy-sanding surface which will make a topcoat enamel looks its best. WR-155 primer is offered in off-white and gray.



WR-155 primer will fill small surface imperfections. However, it will not substitute for a fairing putty or a layer of epoxy coating or laminating resin. A minimum of three coats of primer is recommended. This should allow for some to be removed by sanding, while leaving enough film thickness for opacity and topcoat adhesion.

The principal purpose of the primer is to provide a smooth, uniform surface for the System Three polyurethane topcoat. However, many other coatings will provide satisfactory results as a topcoat. A secondary function of the primer is to help poor-hiding topcoat colors look uniform and opaque. Lead-free red, orange and yellow topcoats do not hide well and the color can appear mottled if the substrate is not uniform. Using the off-white primer with these can provide a more uniform, less mottled surface appearance.

WR-155 primer dries by evaporation and then cures in a temperature-dependent epoxy/hardener curing reaction. It may be recoated with additional primer after it is dry to the touch but it should not be topcoated until after it cures. Curing takes about a day in warm temperatures and longer in cool weather. Test for cure by wetting a finger and rubbing it on the primer. If your fingertip picks up some primer then it is not cured. The film will not be water-resistant until it is cured. Rain or moisture from dew or condensation can damage the film. The primer cures as a relatively rigid film, so is not recommended for use on flexible substrates like fabric or thermoplastics.

The Activator may start to turn white or grainy after sitting unused for months. This is actually tiny resin crystals forming, like they do in honey. Recover the material, like honey, by heating the container to about 120°F until the Activator is once again clear and bright.

## WR-LPU Urethane Topcoat

System Three® WR-LPU™ is a two-part, water-borne linear polyurethane enamel. It will provide appearance and performance equal to its solvent-borne counterparts. WR-LPU topcoat comes in clear gloss, clear satin, and 12 popular colors.

The WR-LPU product consists of a can of paint and a bottle of crosslinking material. The paint by itself cures to a very high-quality coating, without the crosslinker. However, the addition of the crosslinking material produces a tougher and more durable film. It will be more chemical and fuel resistant, have better gloss retention, and generally last longer than a film cured without the crosslinker.

Paint cured without crosslinker may be recoated up to two weeks without sanding. However, a crosslinked film, because it is much tougher, must be sanded if recoating takes place more than one day after the previous coat was applied. Some sanding can be avoided, at the sacrifice of some durability, by mixing crosslinker into only the last coat. The crosslinker reacts with the polyurethane resin in the paint, but also reacts slowly with water. Crosslinked paint not used within 8 hours will lose the added durability. A readdition of crosslinker can be done, however, without any loss of properties.



Pigmented (colored) WR-LPU is available in a semi-gloss finish. Clear WR-LPU is available in satin or high gloss. For a high-gloss colored finish, use 1-2 coats of color, followed by 1-2 coats of high gloss Clear WR-LPU.

When enough water evaporates a film begins to form and the paint is "set-to-touch." This can happen in hot weather before the paint does not have adequate time to flow out. Further thinning to solve this may result in runs and the only solution will be to wait until the temperature drops or raise the humidity in a closed room by spraying a quart of water into the air.

### Notes:

We factory-tint all our colors, using special pigment dispersions that these materials require. Custom-matched colors are available, in gallons only, for an upcharge. System Three requires a sample of the color to be matched, . Be sure that you choose your custom color carefully as we cannot accept returns of tinted paint.

Plan on a minimum of three applications when using our topcoat. While you may have sufficient "hide" with only one or two coats you will not have sufficient dry film thickness to provide maximum protection. Premature weathering of the paint film may occur under these circumstances. The three coats may consist of a combination of pigmented and clear coats.

Polyurethane paints, while giving excellent water resistance, are to be used above the waterline only. Constant immersion for months can cause blistering of the paint film.

Bare, or System Three epoxy coated wood can be coated directly with WR-LPU clear or colors, without primer.

## SURFACE PREPARATION

Use epoxy resin with microballoons to fair or level out flaws and imperfections in the surface to be painted. Seal sanded microballoon putty with a thin coat of clear epoxy to eliminate any surface porosity and roughness. Surfaces to be painted must be free of dust, grease or oil. Do not use a tack rag to remove dust. They usually contain wax or other materials that can leave a residue on the surface that is incompatible with water. Waterborne paints have a difficult time wetting contaminated surfaces.

**Aluminum:** Apply a wash, or etching primer according to manufacturer's instructions. Allow to cure, then apply WR-155.

**Composite surfaces** such as wood/epoxy or polyester resin should be cleaned of dirt, oil, & other contaminants then sanded with up to 150-grit sandpaper. Remove all sanding dust with a damp or alcohol-wetted rag prior to primer application.

**Mild Steel** should be cleaned of rust, oil, & dirt, then chemically etched or sandblasted.

**Wood** should be cleaned of dirt, oil, & other contaminants then sanded with up to 150-grit sandpaper. Remove all sanding dust with a damp or alcohol-wetted rag prior to primer application.

## APPLICATION

**Temperature:** Use WR-155 or WR-LPU when the ambient temperature is between 55-85°F.

**Coverage:** The following will serve as a guide for ordering the correct amount of paint for your project:

WR-155 Epoxy primer: 200-250 ft<sup>2</sup>/gallon

WR-LPU Urethane topcoat 350-400 ft<sup>2</sup>/gallon

**Film Thickness:** The following yields are our recommended based on the coverage rates shown below:

PRODUCT	Wet Film Thickness	Dry Film Thickness
WR-155 Primer	3 - 4 mils	1½ - 2 mils
WR-LPU Topcoat	6 - 7½ mils	2½ - 3 mils

To measure wet-film thickness, use a film-thickness or "notch" gauge. They are available at most paint stores.

**Equipment:** Both products can be applied by brush, roller, or spray. The best results are obtained by using spray equipment. HVLP sprayers, intended for use with waterborne enamels, will give the least amount of dry and overspray, with maximum fan and material flow control. Both the turbine type and air-assisted are used successfully. With some practice at lowering air pressure and increasing material flow, a conventional pressure sprayer will give acceptable results too.

The amount of thinning is not only a function of the equipment but it also depends upon ambient temperature and humidity. The lower the temperature and the higher the humidity, the more open time the LPU will have. Thin the material just enough to get rid of "orange peel" in the dry film and no more. Starting at 10-15% for both the primer and LPU. Needle and tip selection vary depending on the equipment. Get the manufacturer's or dealer's recommendation for spraying waterborne enamels. The nomenclature can be confusing. With solvent-based, or conventional topcoats, there is a distinction between the kind of needles and tips used for enamels and polyurethanes. With waterborne products, there is no such distinction. A general recommendation for tip size is 1.0 millimeter.

Turbine air is quite warm and dry and can dry the WR-LPU too much in the fan. When using a turbine type HVLP, an extra hose section can help. The extra hose section allows the air to cool. On warm dry days the extra section can be coiled in a five-gallon bucket of ice water.

Acceptable results can be obtained by brush or roller application. For brushing, use a high-quality synthetic bristle brush. For rolling, use a 1/8 or 1/4 inch nap roller.

**Primer:** Thin WR-155 with a 50/50 mixture of isopropyl alcohol and water. While it can be thinned with water alone, the alcohol-water mixture is much more efficient. Clean brushes and equipment with soap and water.

Mix no more material than can be applied within 60 minutes. Apply a full wet coat but not so much that it starts running. The primer loses a lot of surface profile as it dries so a little "orange peel" in the wet primer coat is acceptable. The wet primer coat will be quite glossy. As the paint dries it becomes duller. Figure 60 minutes at 80°F and 50% relative humidity, longer if the temperature goes down or the humidity goes up. With spray application the primer may be recoated after it is tack-free. With brush or roller wait until the primer is dry.

Once dry the primer takes anywhere from overnight (hot, dry weather) to three days (cool, damp weather) to cure. Protect outside projects from rain or dew until it has cured. Do not apply the WR-LPU topcoat until the primer has fully cured.

Once cured the primer will sand easily. Start with 100-120 grit or and progress through 220-320 grit in preparation for topcoat application. Type of sander will govern the grit of sandpaper. Use the next finer grit to remove the sanding scratches from the previous coarser grit. Sanding grooves will show through into the finished topcoat. Cured WR-155 may be wet or dry-sanded. Remove all dust from your work and shop, make sure the sanded surface is free of grease and oils, and you are ready for applying the topcoat.

**WR-LPU Topcoat:** Add crosslinker at the ratio of 2 fluid ounces per gallon of paint base, or 8 drops of crosslinker per ounce of paint. The topcoat may be thinned prior to use, using clean water. The amount of thinning will depend upon the environmental conditions and method of application. The recommended range is up to about 25%. Dilute the crosslinker by adding it to the water, then add the mixture to the paint. The optimum amount of thinning will depend on the temperature and humidity.

Conditions are more critical when applying WR-LPU as compared to the primer. It is more difficult to get good results in hot dry weather as the paint can dry in the air before contacting the surface when spraying, or before leveling out when brushing or rolling. Never paint a surface that has been in direct sunlight for hours. It can be hot enough to dry the paint before it can level out.

When spraying, make multiple light passes with the gun to the point where the droplets almost flow together. This will give the best results. As the droplets begin to level they will coalesce and flow into a film.

When brushing, first spread the material out, then work back into the wet material with long, slow strokes. When rolling, use the short-nap roller mentioned earlier, and then go back over the wet coat lightly, with a dry brush, foam or bristle, to pop any bubbles. This is called "rolling and tipping."

Subsequent coats may be applied as soon as the previous film has set and is not marred by a light touch. This is about 30 minutes at 80°F and 50 percent relative humidity. The previous coat may be masked in about an hour. Recoating of crosslinked coats should take place within eight hours of the subsequent coat while non-crosslinked coats have a non-sand recoat time of about two weeks. If more time than this elapses you should sand the previous coat to remove the gloss. Apply a minimum of three coats of WR-LPU, four if sanding and buffing.

For maximum durability, the final coat(s) of WR-LPU should be crosslinked. This will improve resistance to solvents and other chemicals, as well as improving abrasion and scratch resistance. A crosslinked coat will be 90% cured in about four to seven days. However, polyurethanes do not develop 100% of their properties for two weeks. When painting a boat hull, for instance, do not put the boat in the water until then.

**Buffing and polishing:** If a higher level of gloss is desired the cured coat may be sanded and buffed. Wet sand with 600 grit sandpaper proceeding in stages through 1500 grit. Buff with a compound equivalent to 2500 grit and finish with something like 3M's *Finesse-It*.

**Cleanup:** Both the primer and topcoat should be cleaned up with water immediately after use. Remove dried WR-LPU from brushes or equipment by soaking in rubbing alcohol overnight, then rinse again thoroughly with water prior to re-use.

### APPLICATION HINTS:

Practice applying paint on pieces of scrap beforehand. Mask parts or panels before mixing the paint. Use a high-quality masking tape intended specifically for low-viscosity paints. Press the edge of the tape with a thumbnail or the back of a spoon after applying to seal the edge. Masking tape should be removed as soon after applying the final coat as the paint won't run, but before the paint has dried. Cover any adjacent areas to protect from overspray.

If a slip-resistant deck or floor surface is desired use System Three Non-Skid Additive when painting. Paint the non-skid area and while still wet, broadcast the aggregate onto the wet paint and allow it to dry. Apply at least one "anchor" coat over the top of the aggregate. System Three Non-Skid Additive is a clear polycarbonate plastic, which is lightweight and will hold up well.

**Safety and Handling:** While these products present no serious safety hazards, some precautions should be observed during use. Try to keep the material off your skin. Cured WR-LPU is difficult to remove without strong chemicals. The WR-LPU crosslinker and WR-155 Activator resin are skin sensitizers. They can cause a severe allergic reaction from prolonged and repeated contact. Except for the Activator all the products mix with water so you should immediately wash them off if skin contact occurs. Remove any Activator by washing in soap and warm water. In case of eye contact with any of these products flush with plenty of water and seek immediate medical attention. Don't take them internally and keep them away from children.

It is not necessary to wear a respirator when applying these products by roller or brush. When spraying, wear a NIOSH-approved respirator for organic vapors.

**Questions and Comments:** We're here Monday through Friday, 7:30am to 4:00pm Pacific Time to help you with your painting questions and problems. Please e-mail us via our website at [www.systemthree.com](http://www.systemthree.com), FAX us at 253.333.8866, or call us at 253.333.8118. You can call our toll free line at 800.333.5514 to find a dealer near you, or if there isn't one, to place an order.

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