Master Spray Chrome Instructions

Introduction

Spray chrome is silver applied to an opaque surface and protected by a transparent top coat. Our Master Spray Chrome Kit contains the chemicals and tools you will need to establish a professional spray chrome operation. The guns are designed specifically to work with spray silvering and our Clear Uni-Coat 2K urethane base and top coat.

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Overview of the Steps

1. Polish and clean the substrate
2. Apply Uni-Coat base coat
3. Air dry for at least 12 hours or bake at 140° to 190°F for 10 to 30 minutes
4. Clean and rinse with distilled or de-ionized water then dry with clean cloth
5. Flame treat the base coat to ensure even wetting and silver adhesion
6. Apply Wetting Agent to the clean, wet surface
7. Apply Sensitizer on top of the Wetting Agent
8. Rinse off the Wetting Agent/Sensitizer mix
9. Silver the surface using light misting strokes
10. Rinse and dry the silver
11. Apply the tinted Uni-Coat top coat
12. Apply additional layers of untinted Clear Uni-Coat if desired
13. Allow the Uni-Coat to cure for 3 days before subjecting the surface to heavy use

Establishing A Spray Chrome Area in Your Shop

The silvering process works the same way whether the piece is supported horizontally or vertically.

- Silvering is a wet process that involves dissolved heavy metals. You will need a way to collect the mirror run-off and treat it with the Waste Treatment Kit included in this Kit.
- Paint fumes and silvering mist are not good to breathe. Your shop needs an active ventilation system. The 3M Organic Vapors respirator included in our Kit traps the fumes from Uni-Coat and Silver.

Compressed-Air Equipment

Air Compressor

For spray chrome, you need an air compressor that can deliver 7 CFM (cubic feet per minute) at 40 PSI (pounds per square inch). The HP (horse power) of the compressor is less important than its delivery rate. The larger the tank (measured in gallons), the less often the compressor will cycle off and on. All of our spray chrome equipment is designed to withstand a maximum pressure output of 150 PSI.

Regulator

You need a regulator to monitor and control the air pressure from your compressor. Some compressors have a built-in regulator and some do not. Some stand-alone regulators include a water trap. We recommend that you install a water trap and empty it often. You need to install the regulator between the air compressor and the manifold.

Air Hoses

If you have a stand-alone regulator, you need to connect it to the air compressor with an air hose. The length of the hose and the size of the connections depend on your compressor and your regulator. You will need another air hose with a 1/4" NPT male end to connect the regulator to the Spray Silver Manifold. Your set-up will be more flexible and easier to repair if you use "quick-connect" connectors throughout. All hoses must be designed to withstand the maximum pressure your compressor can supply. Our hoses are designed to withstand a pressure of up to 150 PSI.

Manifold

The manifold is a rigid brass assembly that allows the compressor to drive multiple devices at once. Given that the base/top coat application and spray silvering stages occur separately, you can disconnect and reconnect the hoses as needed or ask us about purchasing a 6-outlet manifold.

HVLP Gravity Feed Gun for Uni-Coat

Clear Uni-Coat is designed to be sprayed with an HVLP (High Volume Low Pressure) spray gun fitted with a 1.0 mm fluid nozzle. The maximum pressure flowing through the air cap is 10 psi. Using a small tip and low pressure ensures the smoothest possible coat.

Silvering Guns

Our Silvering Gun Set includes

- Silvering gun (dual-nozzle) for the silvering chemicals
- Sensitizer gun for the tinning solution
- Distilled water gun for rinsing
- Air gun to force dry the finished silver

Silvering Gun

The silvering gun is basically two guns joined together with one handle and one trigger. The gun keeps the silver and the reducer separate until they mix on the surface.

Our silvering gun has a stainless steel body to resist attack from the silver chemicals. It has a ¼" NPT male inlet to attach to the female-ended hose. Each side has a separate a screw head and feed tube that attaches to a separate 1-quart HDPE bottle – one bottle for the Silver and one for the Reducer.

The jets from the two guns come together at a point about 1 foot in front of the gun. To get a smooth layer of silver, hold the gun at least 1 foot away from the piece so that the chemicals merge before they hit the surface. You will get better results if you repeatedly mist the surface with silver rather than blasting it.

Balancing the Silvering Gun

Before you use the guns, be sure that each side is delivering the same rate of flow. Use distilled water for this test, not silvering chemicals or tap water. Measure 500 mL of distilled water into each bottle and attach the bottles to the gun. Point the gun into a sink or tub, squeeze the trigger and hold for about 30 seconds. Remove the bottles from the guns and set them flat on your bench. The bottles should have lost the same amount of water. If the level is not the same, adjust the knobs on the end of each gun and repeat the test until the guns are spraying equally. The silvering process will not work if the guns are out of balance by more than 10%.

Sensitizing Gun

This is used to deliver the Sensitizer – also known as the tinning solution. You *must* sensitize the surface before you silver it. The sensitizer is held in a one quart (1 liter) bottle underneath the gun. The gun and the metal parts of the HDPE bottle are made of stainless steel to resist attack from the sensitizing chemicals. The angle of the bottle relative to the gun can be adjusted when you attach the bottle.

Water Gun

The water gun is used to rinse the object with distilled water between each step in the process. You must use distilled, de-ionized or reverse osmosis water for silvering. The water gun has a barbed connector and a plastic hose that feeds into a distilled water container. The container must allow air to flow in as the gun draws the water out.

Distilled, de-ionized and reverse osmosis water are all acceptable options for the spray chrome process. We have a simple test for water purity at http://angelgilding.com/about-water-purity

Air Gun

The air gun is used to blow-dry the piece after you silver it and before you protect it with the top coat.

Preparing the Substrate

Uni-Coat will not adhere to a dirty surface. By reflecting light at different angles, the silver will make imperfections in the surface very noticeable. The surface must be perfectly smooth before you apply Uni-Coat base coat. It does not have to be glossy. Uni-Coat base coat will add the glass-like surface needed for a mirror finish.

Plastic

Clear Uni-Coat adheres well to most plastics. It does not adhere to HDLP or LDPE (polyethylene). Before applying Uni-Coat, wipe a plastic surface well with a soft cloth and denatured alcohol or rubbing alcohol to remove any mold release compounds that might remain from the molding process. Do not use paper towels which can scratch the plastic.

If the plastic item you want to silver already has a high gloss finish, you do not need to apply a base coat. The silvering chemicals will adhere directly to most plastic surfaces. Remember to remove the mold release coating with alcohol and to wash off any grease, dust and fingerprints with Concentrated Glass Cleaner and a clean cloth or sponge.

Metal

The chemistry of the silvering process *does not work when applied to a bare metal surface*. You must base coat a metal surface before silvering it. For maximum adhesion, we suggest that you apply a metal primer before applying our high gloss Uni-Coat. Clear Uni-Coat adheres firmly to most metal primers.

Applying the Basecoat

Apply the basecoat in one wet coat, avoiding a dry, misted appearance. Clear Uni-Coat builds quickly. One thin wet coat adheres better than a thick coat.

The high gloss surface of the Uni-Coat will reveal any defects in the substrate. If you want to apply a second layer, allow the first layer to flash off for 3 to 4 minutes before applying the second layer. Apply the second layer in less than one hour or allow the first layer to cure for at least 24 hours.

If air-drying, allow the Uni-Coat to cure for at least 12 hours before silvering it. There is no upper limit on the time. You can let it sit for weeks – just be sure to clean it well with Concentrated Glass Cleaner before silvering.

Uni-Coat can also be force dried. Allow it to flash off for 15 minutes before baking at 140° to 190° F (60° to 90° C) for 10 to 30 minutes. Dense, heavy parts require a longer bake time. Once cool, Uni-Coat is fully cured and can be silvered immediately.

Flame Treating the Base Coat

Plastics such as Clear Uni-Coat repel water because, unlike glass, they have a very low level of surface energy. Water molecules on the surface are more attracted to each other than they are to the plastic – they form beads and roll off. The answer is to increase the chemical attraction between the plastic and the water.

When you pass a lean blue flame about 1 inch above a plastic surface, the heat from the flame ionizes the air around it. The ionized oxygen alters the structure of the surface molecules which increases their surface energy. The energized molecules can now bond to the water-based Sensitizer which bonds to the silver. This chemical process is often visible as a thin mist rising in front of the flame.

Do not allow the blue cone of the flame to touch or burn the base coat. You are not trying to heat or melt the base coat – you are using the flame to create an ionized air stream over it. A thin blue oxidizing flame creates a more ionizing atmosphere than a heavy, bushy flame.

1. Light the torch and adjust it to a narrow blue (oxidizing) flame.
2. Hold the torch so that the inner cone of the flame is about 1 inch above the surface.
3. Begin at one end of the piece and pass the torch slowly down to the other end.
4. For large pieces, move in stripes to cover the piece evenly.
5. Keep the torch moving to avoid melting or burning the surface

Turn off the torch. The piece should be cool enough to pick up. Proceed with the chroming process starting with Wetting Agent and Sensitizer. The effects of flaming last a few hours so it is best done the same day as the silvering

Applying the Wetting Agent

Wetting Agent breaks the surface tension of water and allows the Sensitizer to attach evenly to the base coat. This will help you to achieve a smooth, even silvered finish.

- Measure out 100 ml of Wetting Agent and pour into the supplied 1 liter trigger spray bottle. Add 900 ml of distilled water. Diluted Wetting Agent has an indefinite shelf life.
- When you are ready to begin silvering, spray the diluted Wetting Agent thoroughly all over the surface to be silvered. Do NOT rinse it off before applying the Sensitizer. The Wetting Agent should mix with the Sensitizer on the surface of the piece.

Sensitizing the Surface

- Our sensitizer is a highly concentrated solution. The mixing ratio for Sensitizer for 2-Part Silver is 500:1. You will need to dilute it before use. Diluted Sensitizer has a shelf life of 6 to 8 hours. Mix up only as much as you can use in one day. One quart (1 liter) of diluted Sensitizer covers about 28 square feet (2.6 square meters).
- Wash the sensitizer bottle with distilled water and empty it.
- Using the included syringe, measure 1 ml of Sensitizer and dispense it into the bottle.
- Measure out 500 ml of distilled water and pour it into sensitizer gun bottle.
- After applying the wetting agent, wait about ten seconds and spray the object with a very generous amount of diluted Sensitizer.
- Wait 30 to 40 seconds for the sensitizer to attach to the surface. Waiting longer than 30 seconds does not help or harm the process.
- Rinse off the Wetting Agent and Sensitizer mix. This rinsing is very important. The sensitizer you need is now attached so firmly to the surface that *you cannot rinse it off*. Any excess sensitizer that remains on the surface will weaken the bond between the silver and the surface. Excess sensitizer can also stain the silver later. Be sure to rinse crevices and holes carefully.

Silvering

Unlike spraying paint, the best results with silvering are achieved with light passes with a period of waiting approximately 10 to 15 seconds between passes. Be sure to reach all areas of your piece and do not concentrate the spray in one spot. The silver takes time to develop. The first layer will look yellow – brown before it turns silver.

It is always better to spray a few passes and then decide to spray more than it is to spray too aggressively and find that you have gone too far. If the surface is darker or slightly brown this could be due to inadequate coverage. You should have a brilliant, mirror finish and be unable to see the substrate.

If any milky/white areas appear, the silver is too thick and you have sprayed too much. Spraying on more silver does not fix this problem. You will have to remove the silver with Silver Remover and start the process over again. A few light passes with periods of waiting in between gives the best results. So long as your piece has not dried out, you can always add more silver.

Rinsing the Silver

After you have silvered the piece, rinse it very well with distilled water paying careful attention to any pockets or crevices where the silver chemicals might have accumulated. Rinsing is an important part of the silvering process.

Air Drying

Use the air gun to dry the piece beginning at the top and pushing the water off and down. Again, pay special attention to areas where the water may be trapped or accumulated. Make sure you do not flick waste water back onto the piece. If you do, just rinse it off with water spray and dry again. After drying with the air gun, leave the silver to dry for at least another hour in a warm location. Any trapped residual moisture will harm the finish later.

Silver Remover

If you are not happy with the silver coat, you can use Silver Remover to clean it off before re-silvering. It dissolves the silver through a chemical reaction. Heavy abrasion is not needed or recommended. Mix equally quantities of Parts A and B and pour or wipe it over the piece. Silver Remover does not affect the substrate. Be sure you have removed all of the silver and that you have rinsed off all of the Silver Remover before re-silvering.

Silver Remover is safe to use on skin, clothing and other surfaces. Wash well after using.

Tint Coat

When you are sure the silver is perfectly dry all over, you are ready for Uni-Coat top coat.

You can add any solvent-based, transparent tint you like to achieve a brilliant candy color or you can add 2 drops of Uni-Coat Lightfast Violet per fluid ounce (30 ml) of Uni-Coat to get a brilliant chrome appearance.

Unlike aluminum or chrome, silver has an optical property called ‘thin film interference’ that makes it appear pale gold or yellow when coated with any thin transparent film – even distilled water. To counter-act this phenomenon, it is necessary to tint the first layer of Uni-Coat that you apply to the silver. While blue is the color opposite of yellow in terms of light, many UV resistant blue tints tend to look green when they are very dilute. The red tones in a Violet tint counteract the greenish look of the blue to give a pure silver result.

Clear Coating

Once you are satisfied with the appearance, you can add an additional un-tinted layer of Clear Uni-Coat to further protect your piece. Thin layers of material adhere better and look more brilliant than thick layers. Uni-Coat cures completely in 3 days at room temperature.

Getting Set-Up

Do this before you begin silvering

1. Set the regulator on your compressor to deliver **40 psi** (pounds per square inch)
2. Attach the compressor hose to the manifold
3. Attach four (4) air hoses to the manifold
4. Attach the four (4) guns – air gun, water gun, sensitizer gun and silvering gun – to the other end of the hoses
5. Confirm that one end of the blue siphon hose is attached to the barbed connection on the water gun
6. Insert the other end into a ventilated distilled water bottle
7. Turn on the compressor and let the tank fill with air
8. Test the water gun to be sure it is operating properly
9. Label one quart bottle “Tin” or “Sensitizer”
10. Fill the bottle half way with distilled water
11. Attach the bottle to the sensitizer gun
12. Spray water from the sensitizer gun to test all the connections and clean the bottle and the gun
13. Empty the bottle and blow all remaining water out of the gun
14. Use a felt pen to write "S" on one side of the silvering gun and "R" on the other side
15. Label one quart bottle "Silver" and the other quart bottle "Reducer"
16. Fill the bottles equally with distilled water
17. Spray water from the gun to test all the connections and to clean the bottles and the gun
18. Adjust the guns to deliver equal amounts of liquid (see above)
19. Empty the quart bottles and blow all remaining water out of the gun

Measuring the Components

Measure the Uni-Coat Base Coat

1. Measure out 8 parts of Resin and add 1 part of Hardener. For example, to make 9 fluid ounces of Uni-Coat, measure out 8 fluid ounces of Resin (240 ml) and add 1 fluid ounce (30 ml) of Hardener using the measuring cup in your kit.
2. Mixed Uni-Coat has a pot life of 4 to 6 hours. Do not mix more than you can use in 1 day.
3. Do not allow Uni-Coat to sit in your gun. Immediately after spraying, pour the Uni-Coat into a separate container and spray a small amount of lacquer thinner through your gun to clean it.

Measure the Sensitizer

1. Measure out 1 ml of Sensitizer using the syringe included with the Sensitizer
2. Dispense it into the Sensitizer bottle
3. Measure out 500 ml of distilled water
4. Pour it into the Sensitizer gun bottle
5. Attach the Sensitizer bottle to the Sensitizer gun

Measure the Silver and Reducer

1. Measure out 30 ml 2-Part Spray Silver Solution
2. Pour it into the "Silver" bottle
3. Measure out 970 ml distilled water and pour it into the "Silver" bottle
4. Attach the "Silver" bottle to the "S" side of the gun
5. Measure out 30 ml 2-Part Spray Silver Reducer
6. Pour it into the "Reducer" bottle
7. Measure out 970 ml distilled water and pour it into the "Reducer" bottle
8. Attach the bottle to the "R" side of the gun

One Page Spray Chrome Checklist

Apply the Basecoat

1. Apply an even wet coat of Uni-Coat over your perfectly clean, smooth piece.
2. Allow the base coat to air-dry for at least 12 hours or force dry it and let it cool.

Silver the Piece

1. Clean the basecoat with Liquid Glass Cleaner and a sponge to remove any accidental fingerprints or dust. Rinse it well with distilled water.
2. Set the piece over a tray to catch the mirroring chemical run-off.
3. Spray it with a generous amount of diluted Wetting Agent. **Do not** rinse off the Wetting Agent.
4. Spray on a generous quantity of Sensitizer. Pay special attention to any high points where the sensitizer might run off too soon.
5. Wait about 30 seconds for the sensitizing to take effect.
6. Spray-rinse the piece thoroughly with the water gun. It is very important to rinse all the Wetting Agent and Sensitizer out of any crevices or holes where they might accumulate.
7. Silver the piece with the Silver Chemicals. Short misting sprays are best. Give the silver plenty of time to develop between sprays.
8. Rinse the silver thoroughly.
9. Dry the piece with the air gun and then allow it to sit until all the moisture is gone.

Apply the Tint Coat

Once the piece is fully dried, tint the Uni-Coat according to the directions and apply one even wet coat until the piece has a brilliant chrome appearance.

Apply a Clear Protective Top Coat (optional)

Apply untinted Clear Uni-Coat to your piece as desired to enhance the durability of your piece.