



SURFACE SEAL® COATING SYSTEM

DOCUMENT/PART NUMBER DSS 1042, REVISION K

MAINTENANCE, ASSESSMENT, APPLICATION PROCEDURES
FOR AIRCRAFT AND SPECIALTY GLASS-FACED WINDSHIELDS

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AEROSPACE TRANSPARENCIES
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REVISIONS

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Note: Coating system application as defined herein pertains to reapplication or first time application to previously uncoated windshields.

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1.0 SURFACE SEAL© COATED GLASS – DEFINITION

Developed to enhance vision during rain conditions, SURFACE SEAL© COATED GLASS from PPG Industries incorporates a durable transparent water-repellent coating on the windshield surface for efficient rain removal.

2.0 APPLICABLE DOCUMENT

The Application Procedure of this document (Paragraph 6.2) is equivalent to PPG Procedure No. LAB-582-COM, dated July 22, 1993, Application of Surface Seal© Coating System To Glass Transparencies. Procedure No. LAB-582-COM is FAA approved.

To assist in that process, PPG offers the Surface Seal© Next Generation Coating system, which includes customized kits for coating-application, refurbishing, and efficiency measurement. DSS1040 Master Kits contain reusable equipment, replenishable supplies for approximately 10 windshields, and chemicals to coat 2 windshields. DSS1015 Application Kits (Kit A) contains supplies and chemicals to coat 1 windshield. DSS1027 Master Kit Refill contains replenishable supplies to prepare approximately 10 windshields less the Surface Seal© prep and coating solutions. DSS2000 - 2999 Curing Kits, contains protective films and customized heating blankets. DSS3000 Coating Efficiency Measurement by Contact Angle Kits are also available but typically only used on aircraft using Surface Seal Coating as the sole rain removal system with stricter requirements for coating efficiency measurement by contact angle determination.

Additional videos are available in NTSC and PAL format to supplement written instructions. They are: DSS1024 Reapplication and First Time Application and DSS1023 Coating Efficiency Assessment. Both videos are included in the DSS1042 Master Kit.

In planning the project, allow about 30-45 minutes for windshield preparation and coating efficiency measurement. Allow about 60-75 minutes for coating re-application and 15-30 minutes for cleanup after heat curing, where a full eight hours is suggested for maximum coating performance improvement (after proper installation of the heat blanket).

NOTE: Electric heat blankets are provided without plugs. Provide correct plugs for each blanket according to power requirement as stated on blanket.

This document is divided into 3.0 Health and Safety, 4.0 Maintenance, 5.0 Coating Efficiency Assessment, and 6.0 Application and Removal Procedures. The user should proceed directly to the paragraph(s) of interest.

Materials not called out specifically in this procedure must be verified in the Aircraft Manufacturer's Maintenance Manuals before use on a windshield. MSDS for any chemicals not supplied in the PPG Kit should be obtained and reviewed prior to use. Chemical formulations containing fluorides or with a PH > 10.5 should not be used on Surface Seal Coated Glass.

NOTE: Coating system application as defined herein pertains to on-aircraft reapplication or first time application to previously uncoated windshields.

3.0 HEALTH AND SAFETY – GENERAL

Throughout each described procedure, it is recommended that gloves (for cleanliness) and safety glasses be worn. For additional health and safety information, refer to applicable safety documents and to the specific MSDS (Material Safety Data Sheet) information contained in the Master Kit.

4.0 MAINTENANCE

The effectiveness of SURFACE SEAL® COATED GLASS is maximized and protected by specific and routine cleaning practices. The Master Kit provides disposable gloves, gauze, towels, and a plastic cleaning pad to assist in this procedure.

4.1 Cleaning Procedure

If applicable, verify windshield heat is turned off. Flush the glass surface with clean water to remove excessive amounts of dirt.

CAUTION: Never use razor blades or scrapers of any type to dislodge adhered particles as these devices may damage the coating or the glass itself. Put on a pair of protective gloves.

Use only clean materials such as a soft cloth or clean sponge or soft paper towel (such as Kaydry[®] Wipers). Wash with glass cleaner such as a 50/50 mixture of Isopropanol and water, or a 50/50 solution of rubbing alcohol and water, or Windex[®] glass cleaner. Adhered particles can be dislodged using the cleaning solution and the plastic cleaning pad. When using the plastic cleaning pad, be extremely careful that the removed particles do not become embedded in the pad and become a potential cause of scratches in the coating or on the glass.

Note: None of the cleaning chemicals recommended for this procedure are provided in the Master Kit. Specific health and safety information for the recommended chemicals should be obtained and reviewed by the user.

Flush thoroughly with clean water and dry. Wipe dry with strokes in one direction using only clean materials such as a damp soft cloth, damp sponge, or soft paper towel (such as Kaydry^{*} Wipers).

To ensure cleanliness within the critical vision area, re-apply the glass cleaner at least twice, wiping thoroughly with disposable towels after each application.

Note: Do not apply polish or wax to the glass surface.

*Kaydry is a United States Trademark of Kinberly Clark Corp.
Windex is a United States Trademark of S. C. Johnson and Sons, Inc

5.0 COATING EFFICIENCY ASSESSMENT

Although the Surface Seal© Next Generation Coated Glass is easily maintained and protected by routine cleaning practices, the coating may not last the entire service life of a windshield. Periodic assessment of coating efficiency can be timed with regular windshield cleaning (Maintenance). If reapplication is required, a straight-forward procedure as detailed later in this document will provide renewed rain repellency.

In planning the assessment, first watch the PPG video "Coating Efficiency Assessment", that provides overall direction and guidelines. This video is contained in the Master Kit. The following instructions provide the specific procedure as demonstrated in the video.

Before beginning coating efficiency assessment, (if applicable) be sure the windshield electrical heat is turned off. It is necessary to gain access to the windshield so that it can be thoroughly cleaned, can be examined clearly, and space is available for kit contents.

Other requirements include a dry environment (not raining, sleeting, or snowing, and preferably roof protected), adequate lighting for inspecting the windshield, ambient temperature in the range 40°F to 90°F (4°C to 32°C), and humidity in the range 20% to 80%. The windshield itself should not be hot to the touch and should be out of direct sunlight.

5.1 Step 1 - Windshield Preparation

Access the Master Kit. Remove one disposal bag and place it in a convenient nearby position.

Using the Cleaning Procedure as described in previous Paragraph 4.1, thoroughly clean the windshield. Kaydry Wipers from the Master Kit can be used for washing and drying the glass surface.

5.2 Step 2 – Evaluation via Photographic Comparison

Access a 500 mL bottle of Deionized Water and the spray nozzle from the Master Kit. Replace the closed cap on the bottle with the spray nozzle. With the nozzle pointing away, turn the nozzle adjustment counter-clockwise until no adjustment remains. The nozzle is now set to deliver a fine mist.

If the disposable gloves have been removed after windshield cleaning, replace them with another pair. Avoiding possible contamination of the glass surface from skin oil is important in this assessment.

Starting at the bottom of the windshield and with the nozzle at a 12" - 18" distance from the glass, pump the spray nozzle to fully wet the windshield with a mist from one side to the other. Progressively work up the windshield until the surface is fully misted. Starting at one side along the top edge, continue spraying the windshield until water droplets roll freely down the windshield. Continue across the windshield along the top edge until water droplets have rolled freely to the bottom of the windshield completely across the windshield. Smaller droplets that "crawl" through an area should be ignored.

NOTE: Once droplets are rolling freely down the windshield, do not continue to spray the same area. "Doubled-up" tracks may provide confusing results.

Examine the appearance of the remaining water on the windshield and the droplet "tracks" and compare within the critical vision area as defined on page 5 to the photographs and photograph explanations (pages 6, 7, 8) of this procedure.

Note: It is possible that the assessment produces more than one result. If such a situation is present, reapplication should be based on the overall performance of the coating within the defined critical vision area.

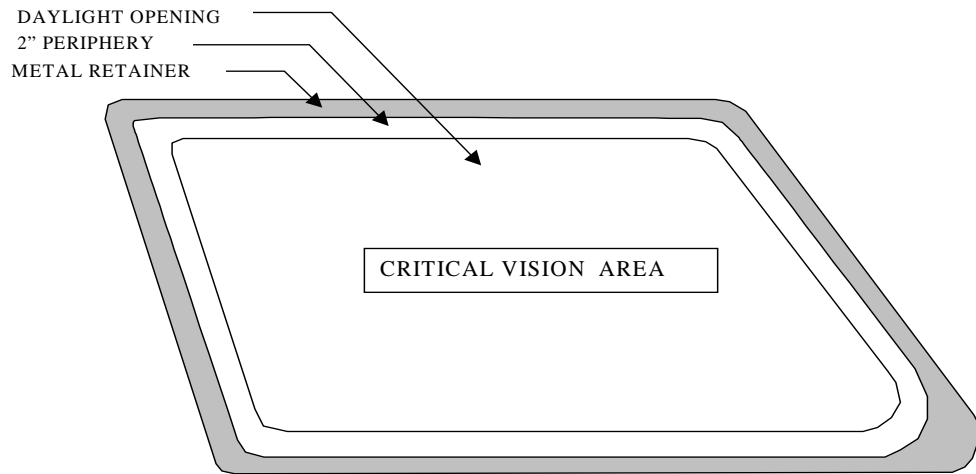


Figure 1 - Critical Vision Area

A two inch periphery around the daylight opening is generally considered unimportant for this assessment, since these vision areas are considered non-critical.

If the coating assessment is judged to be "like new" or "acceptable", no further action is required.

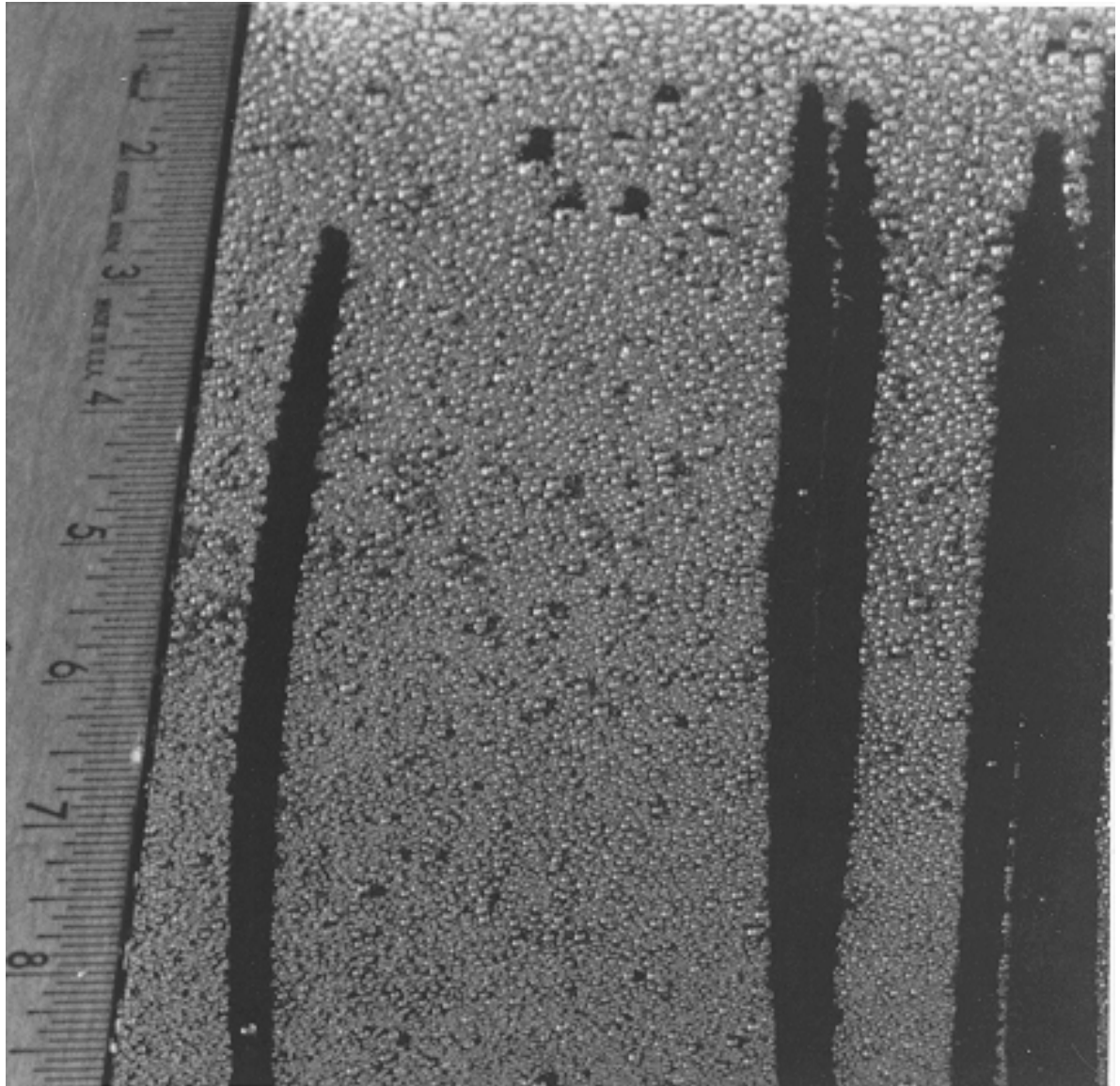
If the coating assessment is judged to be "conditional", coating refurbishment should be scheduled, or the alternate measurement procedure (5.2.2) should be performed.

If the coating assessment is judged to be "unacceptable" coating refurbishment must be accomplished. Proceed to 5.3 Step 3 - Follow-up.

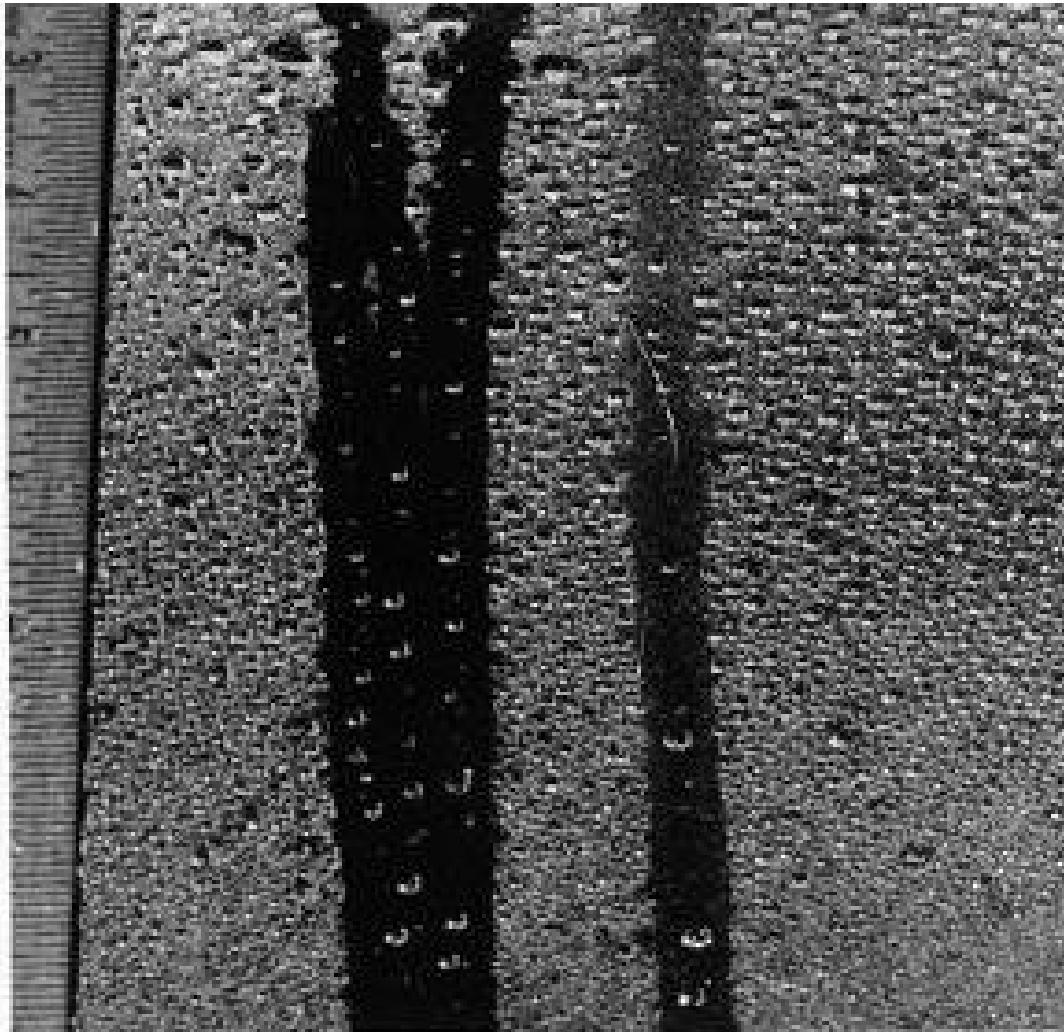
Once the water misting assessment has been completed, remove the spray nozzle from the water bottle and pump all water out of nozzle. Recap the water bottle, and return it and the nozzle to the kit.

5.2.1 Coating Efficiency Photographs

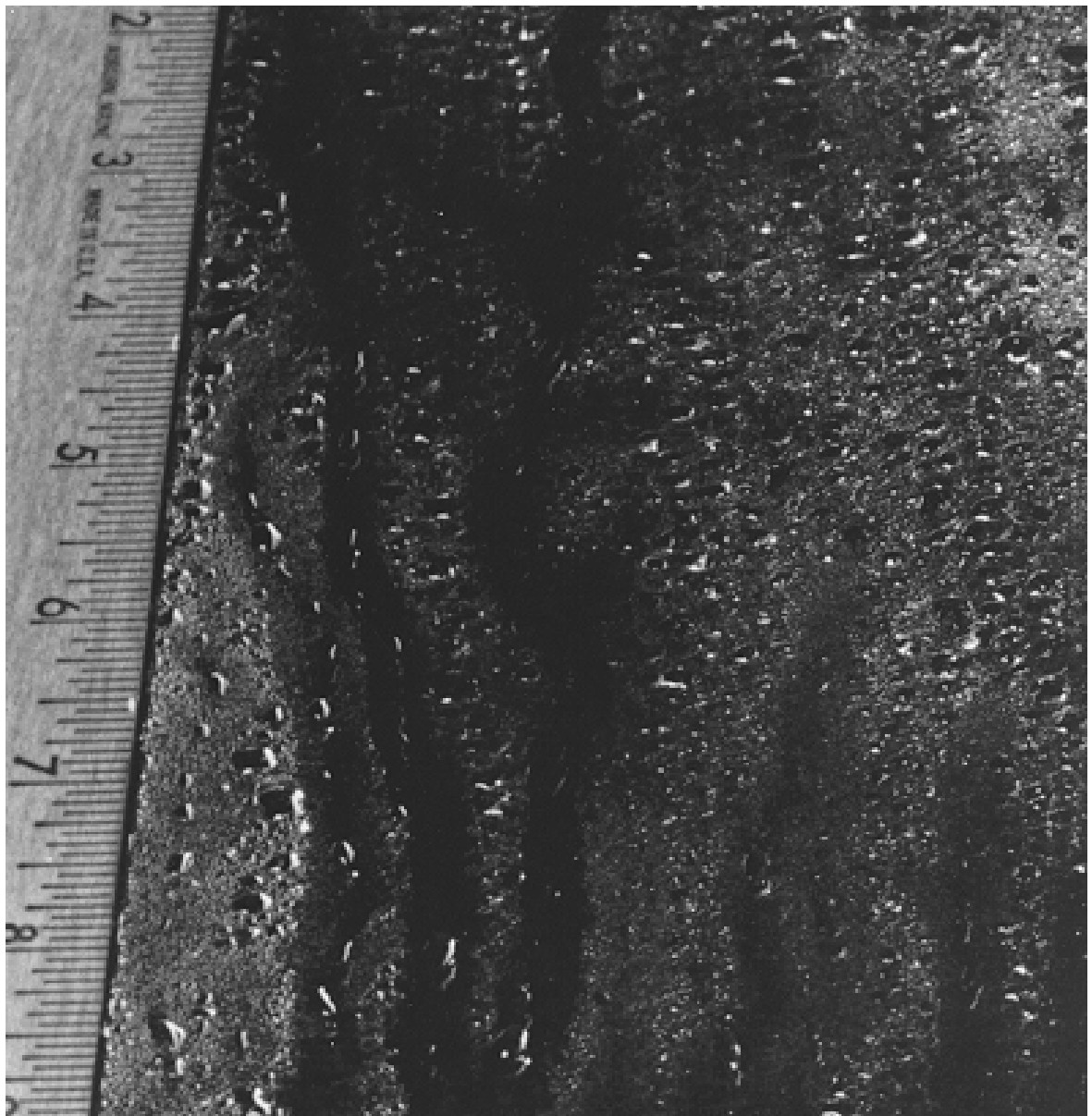
5.2.1.1 Like New Coating Performance - The sprayed water remains “beaded-up” as small droplets circular in shape. Water droplet “tracks” leave no water residue in the track itself. The coating is very water repellent, and no reapplication is necessary.



- 5.2.1.2 Acceptable Coating Performance - The sprayed water remains "beaded-up" but as slightly larger droplets (compared to 5.2.1.1). The largest droplets will be slightly elongated in the direction of gravity. Water droplet "tracks" leave water droplets within the "tracks" that are essentially elliptical in shape. The coating provides acceptable vision in rain. Reapplication is not necessary, but may be required after the next scheduled assessment.



5.2.1.3 Unacceptable Coating Performance - The sprayed water forms droplets of larger size (compared to 5.2.1.2) and of irregular shape. The largest droplets will be elongated in the direction of gravity. Water droplet “tracks” leave larger droplets within the “tracks” (compared to 5.2.1.2.) that are elongated in the direction of gravity and of irregular shape. Some of the sprayed water may form only large droplets that combine with other droplets to form “sheeted-over” areas devoid of droplets. The coating has degraded to the level where reapplication must be accomplished.



5.2.2 Alternate Measurement Procedure Via Contact Angle Measurement

In preparation for contact-angle measurement, first watch the PPG Video, DSS1003 titled "Coating Efficiency Measurement by Contact Angle", which provides overall direction, and step-by-step guidelines. This video is contained in the Measurement Kit and Specialized Master Kits where the Aircraft manufacturer requires contact angle determination, typically when wipers are absent and surface seal is the primary rain removal system.

NOTE: These written instructions are designed to supplement that video and should not be used without first watching the video program.

Inspect the contents of the Measurement Kit carefully, and read all identification labels. Except for the safety glasses, tape measure, and pen or pencil, all supplies and equipment needed for contact-angle measurement are included in the Measurement Kit.

NOTE: Use only these materials throughout the process, and make no substitutions.

5.2.2.2 Coating Efficiency Measurement Process Using Contact Angle

To protect materials during transit, all liquids have been closed-capped for shipment. Retain original cap for use in future shipment.

If the windshield is wet from the misted water procedure, dry it thoroughly using disposable towels from the kit.

If the windshield coating efficiency has not been assessed using the misted water procedure, the windshield should be prepared using, - Windshield Preparation, before proceeding further.

Remove the macroscope from the instrument case. Focus the reticle with the upper knurled ring, and set it aside. (Note: a battery-powered illuminator is supplied for use in reduced-lighting conditions.)

Remove the pipetter from the instrument case. Attach a 500 microliter tip; fill it with Deionized Water (Solution No. 2), and set the pipetter dial to "one."

Because the pipetter can dispense an incorrect amount of water the first time, release one ten-microliter drop onto a non-test area of the windshield and wipe it away.

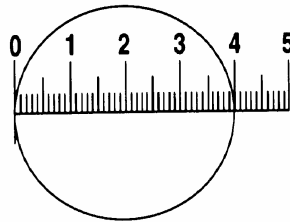
Move to the first specified test location and gently push out one ten-microliter drop of Deionized Water from the pipetter and touch the

drop to the windshield. Slowly withdraw the pipetter, leaving the drop on the glass surface undisturbed. (The "Coating-Efficiency Measurement" video demonstrates this procedure in detail.)

Since evaporation will affect accuracy, drop-length dimension must be measured and recorded within one minute of drop placement. Place the macroscope on the glass surface, centered over the water droplet. (Removal of safety glasses will reduce awkwardness and widen your field of vision.)

Adjust the image focus along the longest dimension of the drop, using the lower knurled ring. Adjust the macroscope position relative to the drop until the image is in focus and one end of the drop lines up with the zero mark, as shown.

With one edge of the water droplet lined up with the zero mark, estimate the drop length to 0.05 millimeter accuracy (minimum scale division is 0.1 millimeter). Use only the upper scale of the reticle, which is 0 to 5 millimeters. (In the view shown, the drop length is 4.00 millimeters.)



Record the measurement onto the "Post-it" sheet. If the length is more than five millimeters, record the drop length as >5 millimeters. Repeat the procedure until five readings have been recorded at the first location. If one measurement is significantly different than the others, do not use it, repeat the measurement.

Once five measurements have been made at all specified locations, calculate the average for each location, and write it on the "Post-it" sheet.

Correlating Drop Dimension with Contact Angle

To correlate the drop dimension with contact angle, compare each of the average drop-length measurements with the appropriate chart in your aircraft maintenance manual.

Compare the lowest contact angle with the maintenance manual specifications to determine whether refurbishment is required.

5.3 Step 3 – Followup

If reapplication is indicated, make all necessary scheduling arrangements. Note that it may be preferable to reapply the coating system to more than one windshield at the same time, even if only one is required.

Schedule the next coating-efficiency measurement, as per your aircraft maintenance manual instructions.

Take an immediate inventory of all contents of the Measurement Kit. If supplies must be reordered, make a photocopy of the Kit C reorder form contained in this instruction booklet. Complete the form, and mail or fax it, as per reorder form directions.

Return all supplies to their proper place. Discard disposal bag in accordance with national, regional, and local regulations.

6.0 APPLICATION AND REMOVAL PROCEDURE

If the results of the coating efficiency assessment indicate that reapplication is required, or if a first time application will be accomplished, prepare for this procedure by first watching the PPG video "Reapplication and First Time Application". Contained in the Master Kit, this video provides step-by-step guidelines and overall direction.

The video is designed to supplement these written instructions, and should not be used without these instructions.

Materials needed for reapplication or first time application are contained in the Master Kit and the Curing Kit. Master Kit Contents are described in Paragraph 8.0 of this document. The Curing Kit is described in paragraph 9.0 of this document. Throughout this procedure, use only PPG approved materials. Do not make any substitutions.

The Curing Kit consists of protective material and electric heat blankets that are configured specifically for the windshields being treated. The protective material prevents the possibility of the heat blanket scratching the glass surface. The heat blanket is thermostatically controlled to provide a curing temperature for the coating. No substitutions are permitted for heat blankets.

6.1 Health & Safety

Inspect the contents of the Master Kit and Curing Kit carefully, reading all identification labels. Read the health and safety information as provided on the MSDS sheets.

Disposable gloves, as included in the Master Kit, should be worn at all times during cleaning, chemicals application, and clean-up.

Because a change of gloves is called for several times during the application procedure, it is suggested that two pair be worn at the same time. Changing only the outer pair facilitates the glove-changing process.

Safety glasses, although not included in the kit, should also be worn from start to finish.

6.2 Application Procedure

To protect materials in the Master Kit during transit, all liquids have been closed-capped for shipment. With the exception of the 15 ml container for Deionized Water (Solution No. 2), replace closed caps with flip-top caps, packed inside the zippered pouch. Screw caps on tightly and make certain that each cap is fully closed after each use. Retain original caps for use in future shipment.

To prevent potential fluid cross-contamination, always match the cap with the bottle.

Before application can begin, five preliminary steps must be taken.

First, as in the assessment procedure, it is necessary to gain access to all areas of the windshield with kit contents available at hand.

Second, the environment must be roof protected or outside with good weather available for the expected duration of the coating application. Ambient temperature should be in the 60° to 85° degree F (15°C to 30°C). Humidity should be less than 45% relative humidity for maximum coating life.

Third, good lighting must be available for inspection of work in process. The windshield itself should not be hot to the touch and should be out of direct sunlight.

Fourth, make certain that the rechargeable orbital sander contained in the Master Kit is fully charged. If not, follow the instructions found inside the box for proper preparation, making careful note of all safety precautions. Allow about one hour for a complete charge. Adapter plugs are provided in the Master Kit if charger plug is not compatible with local power source receptacle.

Fifth, a 220/240 volt AC power source must be available at the windshield for the heat blanket cure.

Obtain a disposal bag and place it in a convenient, nearby location so that used materials can easily and safely be discarded throughout the process.

Put on your disposable gloves and begin.

6.2.1 Step 1 - Windshield Cleaning

Remove one disposal bag and place it in a convenient nearby position. Using the Cleaning Procedure described in Paragraph 4.1 of this document, thoroughly clean the windshield. Use Kaydry Wipers from the Master Kit for washing and drying the windshield. Deposit soiled towels in the disposal bag.

Note: If a windshield wiper is parked on the glass surface, this entire application procedure will be easier to accomplish if the wiper arm spring tension is released and the wiper arm taped away from the windshield. Refer to the appropriate Maintenance Manual for wiper removal and functional checks.

Using quarter-inch tape from the Master Kit, mask the glass periphery of the windshield (as illustrated on page 18) right up to the edge of the seal.

Note: Disposable gloves may be removed here if the taping step is easier to do bare-handed.

Remove a roll of two-inch tape from the Master Kit and apply it to the windshield periphery. Start by partly overlapping the quarter-inch tape, span the moisture seal and terminate on the windshield retainer or structure as illustrated below.

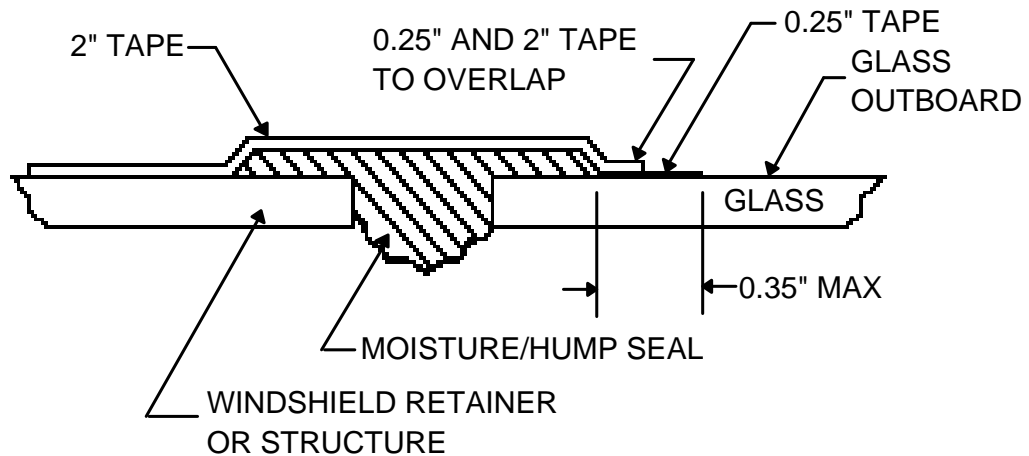


Figure 2 - Taping

Return the tape and scissors to the Master Kit. If gloves have been removed or torn during the taping process, replace them before proceeding. Gloves are extremely important in subsequent steps because elimination of skin-oil contamination is critical.

Remove the felt pad from the plastic bag inside the box labeled Kit A, and attach it to the fully charged orbital sander.

Note: The PPG-supplied sander is the only one approved for this process. Make no substitution. Use of other equipment such as an air powered sander can result in oil contamination of the glass surface or permanent damage to the windshield.

Before starting the polishing operation, examine the windshield to determine if any "staining" (example - RAIN-BOE build-up) is apparent. If such areas are apparent, extra polishing may be required to remove the contamination. Put on a clean pair of gloves and attach a clean felt pad to the orbital sander.

Remove the 500 mL bottle of Polishing Slurry. No substitution for this polishing compound is permitted. Shake the polishing slurry bottle until the slurry is consistent, then apply approximately 20 ml of the applicable slurry to the felt pad using the markings on the polishing slurry bottle. Be certain that no extraneous dirt or grit of any kind contacts the felt pad, and make certain it is moistened with slurry prior to contact with the pre-cleaned glass surface.

Usage must be at least ~3 mL per square foot and be sufficient to initially wet the pad thoroughly and to keep the glass wet during polishing.

Lightly set the felt pad on the glass surface and turn on the sander. Light pressure sufficient to keep the sander flat against the surface and the weight of the sander itself on the felt provides sufficient polishing force on the glass surface. Use overlapping strokes and cover the entire glass surface evenly. Add additional slurry as needed to keep the felt pad moistened throughout the polishing process. Do not allow the slurry to dry on the glass surface during the polishing process; all polishing must be performed with a wet slurry. It is acceptable to add more polishing slurry to the surface to keep it wet. Do not add too much polishing slurry so as to cause the slurry to spray from the pad. A thin, cloudy film of slurry will be left on the glass surface; but if it "breaks up", that is, if the Polishing Slurry does not remain in a thin film, continue the polishing operation. Use long horizontal strokes followed by short vertical ones.

For parts **without antistatic coating**, continue polishing until the surface "wets out." Continue to polish until the total polishing time equals 1 minute per square foot of windshield area. Measure the length and the width in feet and multiply the two numbers to approximate total area. This number is the minimum required minutes of polishing.

If after the required number of minutes for polishing, the surface has not "wet out," continue polishing until the surface "wets out." If the surface "wets out" before the required number of minutes for polishing, continue polishing until the time period is satisfied.

Parts with antistatic coating may not "wet out." For antistatic parts, continue the polishing with the Cerium Oxide Polishing Slurry for a maximum of **two** polishing coverages of the surface (once in the horizontal direction and once in the vertical direction) at a linear rate of 1 foot per 2-3 seconds with pressure only sufficient to keep the sander in contact with the windshield.

After two complete coverages, there may still be areas that will "break up," or not "wet out." This is the nature of antistatic coatings. **DO NOT POLISH ANY FURTHER. TO DO SO MAY DAMAGE THE ANTISTATIC COATING.**

After completing the polishing operation, set the sander aside on a clean Kaydry and remove and dispose of gloves used during the polishing operation. Put on a clean pair of gloves and clean all polishing residue from the glass surface and taped areas. Do not allow the slurry film to dry before cleaning. Change gloves as necessary during the cleaning process.

Spray the surface with DI water and begin wiping in the center of the windshield toward the taped edges, taking care not to wipe the taped edge. Wiping the taped edges and then wiping the center can transfer contamination from the tape to the glass.

After the glass area has been wiped clean, wipe the slurry from the taped edge areas, by wiping along the sides and edges. Do not wipe toward the center of the part from the taped edge. Discard the used Kaydry.

Continue cleaning with fresh Kaydry towels until all traces of the slurry have been removed. Inspect the used Kaydrys for polishing residue. Continue cleaning until no visible residue is picked up by a fresh Kaydry. Polishing slurry residue left on the glass surface or picked up with a Kaydry from the taped edge can contaminate the glass surface and cause staining during application of the surface prep.

Mist the dried clean surface with DI water and test for a water break-free state, where water sheets and completely wets the surface. If beads of water are present, resume polishing until a water break-free state is obtained.

Note: Obtaining a water break free surface only applies to parts without antistatic coating. Do not over-polish antistatic parts.

Note: Remove soiled gloves carefully by pulling the cuff down over the hand so that the glove is removed inside out. This prevents any possible contamination by contact with the glove as it is deposited into the disposal bag.

Put on new gloves, and remove a 500 mL container of Deionized Water and several disposable towels from the kit. Wash and dry the windshield thoroughly to remove all traces of Polishing Slurry and continue wiping until the glass is completely dry.

Note: If "stained" areas persist, repeat a localized polishing with additional slurry applied to felt pad. Repeat localized wash and dry steps using Deionized Water and towels.

Don't let thick water films evaporate, as this causes contamination of the surface; and don't use any other chemicals or cleaners to remove the Polishing Slurry residue.

To insure the glass surface is clean from all contaminants or previous hydrophobic coating, an evaluation is necessary. Attach the spray nozzle from the Master Kit to the 500 mL bottle of Deionized Water. With the nozzle pointing away adjust the nozzle completely

counter-clockwise. Wet the entire windshield thoroughly until water rolls freely down the surface. The glass is thoroughly clean when there is no beading of water droplets, and when water droplets will combine to "sheet-over".

Note: If beaded water droplets are still present, repeat the polishing procedure in the affected area, repeat localized wash, dry, and evaluation as described previously until no beaded droplets form.

Dry the windshield thoroughly before continuing this procedure.

Remove the soiled gloves and deposit them in the disposal bag. The windshield glass surface is now extremely clean. The next step, Surface Preparation, should be started within fifteen minutes to prevent possible soil (dust) contamination of the glass surface.

6.2.2 Step 2 - Surface Preparation

Whenever possible, the process should not be interrupted after the Polishing Slurry Operation. No more than 15 minutes should elapse from the completion of the Polishing Slurry Operation until application of Surface Prep and Coating Solution. If it is unavoidable to delay the applications, when resuming the process, reclean with D.I. water and Kaydrys.

Make sure the surface appears the same as it did when the polishing slurry operation was completed. If there is any evidence of contamination, repeat the polishing slurry operation. Under no circumstances should any adhesive material be applied to a surface after the Polishing Slurry Operation and before application of Surface Prep and Coating Solution.

Put on a clean pair of disposable gloves, and remove one Surface Prep ampule and two applicators from Kit A in the Master Kit. Visually inspect the Surface Prep Ampule to make sure it is not broken. Do not use if the glass has been broken or if there is any indication of white precipitate or leakage into the foam end.

Note: The Surface Prep material can be corrosive to the structure and may damage paint. Before proceeding, ensure that the tape masking the windshield is intact to prevent the chemical from wicking into the structure. Clean any spills immediately.

The Surface Prep ampule is surrounded by sealed plastic tubing above the foam filter. To open it, use scissors to cut off a corner of the plastic tubing at the top as illustrated. Do not cut into the foam.

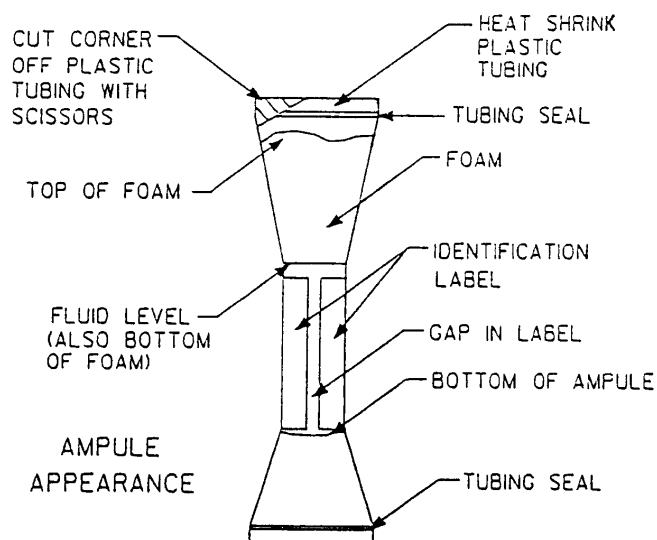


Figure 3 – Surface Prep Ampule

Hold the ampule in your hand and press against the sponge tip end with your thumb until the ampule snaps. Application should be completed within 15 minutes after the ampules are opened.

Obtain one of the film backed application pads. Dampen the pad with approximately 2 mL of Surface Prep solution, turning the pad so as to not drip significantly. Apply an additional 2 mL to the pad (total solution approximately 4 mL, or 1/5th of the ampule contents to begin wiping).

NOTE: Do not hold the pad over the aircraft structure or glass surface while pouring.

Immediately begin wiping quickly over the center portion of the glass surface with slightly overlapping straight - line strokes. If necessary, use a separate, dry gauze pad to immediately wipe away excess Surface Prep solution.

To prevent contamination of the center glass surfaces with residue from the taped edges, wipe in the center and wipe toward the edges. Stop each wiping pass just short of the taped edge.

A thin film of solution will trail from the applicator and quickly evaporate from the glass surface. Do not allow thick films of liquid to accumulate on the glass surface. If the solution is not quickly

evaporated or wiped from the surface (within 2 to 3 seconds), a staining may occur.

Prep solution usage should be at least 0.8 mL per square foot for each Surface Prep application, in addition to the amount used to initially dampen the pad. Thus, a 10 sq. ft. part would require: 2mL to wet the pad, plus $10 \text{ sq. ft} \times 0.8 = 10 \text{ mL}$ solution each application. (A very small part of ~4 square feet can use as little as 5.2 mL per application.)

As the pad begins to dry, add more Surface Prep (another ~1/10th to as much as 1/5th the ampule contents may be added depending upon window size) to the application pad so as to maintain the thin trailing film that evaporates quickly.

After thoroughly wiping the center area, wipe around edges, then discard the pad. Do not wipe the center area with the same pad that was used to wipe around the taped edges.

Repeat the application, starting in the center of the windshield, to apply a second application of the Surface Prep to the surface. Discard any remaining Surface Prep Solution. **Do not save material to use on another part.** Inspect glass surface for staining or streaking from the Surface Prep Solution residue.

If the streaking or haze is localized, it should be possible to remove the extra Surface Prep thickness by reworking just that one area. Apply some Polishing Slurry to the felt pad, and use the orbital sander to very lightly polish the problem area. Clean the area with Deionized Water and dry it with a clean disposable towel. Examine the area to see if the problem persists. If it does, repeat this sequence of very light polishing, washing and drying until the streaking or haze is eliminated.

If the problem is wide-spread across the windshield, all previous steps will need to be repeated using the sander and Polishing Slurry on the entire glass surface starting with Paragraph 6.2.1.

After the haze or streaking has been eliminated, remove soiled gloves and put on a clean pair. Thoroughly wash and dry the entire windshield surface using Deionized Water and clean disposable towels.

If Surface Prep does need to be reapplied, an additional ampule and applicators are included in Kit A.

If re-application is not required, retain the extra Surface Prep ampule for possible future use. Keep it, along with the proper health and safety instructions, inside the Master Kit.

Do not save the opened ampule(s).

Remove the felt pad from the orbital sander and place the pad in the disposal bag. Apply some Deionized Water to a clean towel and wipe off the sander. Return the sander to the storage box in the kit. Remove soiled gloves and deposit them into the disposal bag.

6.2.3 Step 3 - Coating Procedure

Put on clean, disposable gloves, and remove the Surface Seal® Next Generation Coating Solution ampule and another applicator from Kit A. Repeat the previously explained technique for opening the ampule: cut off the top corner of the plastic tubing surrounding the ampule above the foam; hold the ampule assembly with the cut tubing pointing upward; break the seal by bending the ampule above the cylindrical reservoir.

Visually inspect the Surface Seal® Next Generation Coating Solution ampule to make sure it is not broken. Do not use if the glass has been broken or if there is any indication of white precipitate or leakage into the foam end.

Holding the ampule away from the aircraft, pour about one- third of the solution onto the applicator, and wipe the Surface Seal® Next Generation Coating Solution onto the glass surface, using quick, circular motions. Begin in the critical vision areas and work toward the outer edges of the windshield. Saving one-half (1/2) to one-third (1/3) of the **remaining** coating solution contents for a reapplication, add more solution as required to coat the entire part thoroughly. Wipe until the pad and the surface become dry and there is a haze over the entire glass surface. Dampen the pad with approximately 2 mL of Surface Seal® Coating Solution, turning the pad so as to not drip significantly.

Apply an additional 2 mL of Surface Seal® Coating Solution to the pad (total solution approximately 4 mL, or 1/5th of the ampule contents to begin wiping). Immediately begin wiping quickly over the center portion of the glass surface. Continue wiping, using slightly overlapping circular strokes. A white haze will appear as the glass is wiped. Continue wiping until the entire surface has been thoroughly covered. As the pad begins to dry, add Surface Seal® Coating Solution as necessary to keep the gauze pad damp.

To prevent contamination of the center glass surfaces with residue from the taped edges, wipe in the center and wipe toward the edges. Stop each wiping pass just short of the taped edge.

After thoroughly wiping the center area, wipe around edges. Do not wipe the center area with the same pad that was used to wipe around the taped edges.

Surface Seal® Coating Solution usage should be at least 0.8 mL per square foot for each Coating Solution application, in addition to the amount used to initially dampen the pad. Thus, a 10 sq. ft. part would require: 2mL to wet the pad, plus $10 \text{ sq. ft} \times 0.8 = 10 \text{ mL}$ solution each application.
(A very small part of ~4 square feet can use as little as 5.2 mL per application.)

Dispose of the application pad, and obtain a fresh application pad.

Clean the glass surface using gauze with Cleaning Solution and Kaydrys until all haze has been removed. If available, cleaning with a 50/50 isopropanol/water and Kaydrys will hasten the cleaning process.

After the entire glass area has been cleaned and dried, repeat the application process using a new applicator. As the applicator becomes dry, add more solution, and continue the process until the ampule is empty. A haze will form over the entire glass surface.

Do not save material to use on another part. If all material is not used up after two total applications, then use up the remainder in the critical vision areas of the part (center of the glass) during the second application. For some small parts, it may not be practical to use up all of the coating solution. In this case, make two thorough applications to the window, then discard the remainder of the coating solution.

Clean the surface with Cleaning Solvent and a gauze, wiping vigorously until the excess haze is essentially removed. Wipe with a dry towel to remove excess Cleaning Solvent. Clean again with the approved cleaner or alcohol water cleaning solution and a paper towel.

If relative humidity is less than 20% improved coating durability may be obtained by treating the coating with additional water. Spread a fresh disposable towel on the coated surface. Using a 500 mL bottle of Deionized Water and the spray nozzle from the Master Kit, spray water on the towel until it is thoroughly wet. The wet towel should adhere to the glass surface. Continue to spread and wet towels, overlapping as necessary, to cover the entire surface. Pat the towels

down and wipe to push air pockets from between the towels and glass surface. Leave the wet towels on the glass surface for five minutes, then remove towels. Dry residual water by patting with disposable towels.

Note: If wind conditions prevent being able to spread and wet the towels, use the spray bottle to thoroughly mist the windshield surface without towels. After five minutes dry water from the windshield with disposable towels.

Place the used applicator, empty ampule, soiled gloves and towels into the disposal bag. Dispose of these materials in full accordance with national, regional, and local regulations.

6.2.4 Step 4 - Heat Cure Options

Heat curing of the coating system is an optional step. Heat curing will result in a more durable, longer life coating; however, the heat curing procedure may be omitted when time is limited. For heat curing instructions, proceed with Paragraph 6.2.4.1. To omit the heat cure proceed with Paragraph 6.2.4.2.

6.2.4.1 Step 4 - Heat Cure

Note: To omit the heat cure proceed with Paragraph 6.2.4.2. To accomplish this procedure, the appropriate Curing Kit is required. Refer to Paragraph 10.4 Curing Kit.

Carefully place a sheet of protective film over the windshield, making sure to line up all edges. Then, secure the film to the windshield retainer or structure at each corner, with short strips of quarter-inch tape.

Apply the correct heating blanket to the windshield's surface and anchor it securely in place, using two-inch tape. Then, plug the blanket into the appropriate voltage power source.

The blanket temperature has been pre-set for the heat curing process, which must continue for a full eight hours. No substitutions for heat blankets are permitted.

CAUTION: Although heat blankets do not transfer heat quickly, the temperature of the exposed surface will be high, so avoid any direct contact during the heat cure period.

This time can be used to recharge the orbital sander. Note, however, that the battery must be at room temperature to receive a full charge from the battery charger.

The work on one windshield is temporarily completed. A second windshield can receive a coating application once the sander battery is recharged.

If only one windshield is to be coated, close the disposal bag and dispose of it in full accordance with all national, regional, and local regulations. The empty Kit A box can be disposed in any trash bin.

After the desired curing time has elapsed, unplug the blanket and allow it to cool down to near-ambient room temperature. This should require no more than five or ten minutes.

After checking carefully to make certain that the blanket is not too hot to handle, remove the tape, blanket, and protective film. Return the blanket to its proper place in the Curing Kit. Remove all two-inch and quarter-inch tape still attached to the windshield and dispose, along with the protective film, in any convenient trash bin.

Note: At this point, continue with cleaning procedure per 6.2.4.2 No Heat Cure, which is identical to the cleaning procedure prescribed in the following section.

6.2.4.2 Step 4A - No Heat Cure

Note: If Heat Cure is desired, see Paragraph 6.2.4.1. If Heat Cure has been used, the windshield will be dry and will not require removal of residual water described in the following paragraph. The cleaning procedure for No Heat Cure is otherwise identical for Heat Cured windshields.

After the residual water has been dried from the windshield, immediately remove all two-inch and quarter-inch tape from the windshield and dispose in a disposable bag.

Put on a clean pair of disposable gloves, remove several disposable towels, and the Cleaning Solvent from the Master Kit. Using the Cleaning Solvent and gauze, remove all visible haze from the windshield, and any residue remaining from the tape.

Because the haze tends to smear rather than clean off easily, this will require some effort. Any variety of wiping techniques can be used, but a two-step approach is recommended: make one pass with a wet disposable towel moistened with the Cleaning Solvent; make a second pass using a dry one.

Several sets of wipings will be necessary. After haze has been removed, wash the windshield with Deionized Water and dry it with disposable towels.

Because the windshield surface is now extremely water-repellent, it may be easier to apply water to the towels rather than applying it directly to the glass.

Discard the disposable gloves (pulling them off inside out) and place them in a disposal bag along with any used towels. Seal the top of the bag, and dispose of it in full accordance with national, regional, and local regulations.

At this point, application/reapplication is complete. However, effectiveness of the treatment and efficiency of the coating must be assessed.

6.3 Coating Efficiency Assessment

Repeat the coating efficiency assessment procedure as explained in Paragraph 5.0 of this document, and as demonstrated in the video cassette "Coating Efficiency Assessment" found in the Master Kit. Record results as required.

If coating performance appears unacceptable, repeat the cleaning steps described in Paragraph 6.2.4.1 or 6.2.4.2. Then repeat the coating efficiency assessment procedure, again recording results as required.

6.4 Windshield Identification

If coating system has been applied to a previously uncoated windshield, the windshield part number may have to be re-identified. Applicable part number decals and/or hydrophobic coated windshield decals are included in the Master Kit. Refer to the appropriate Service Bulletin or applicable document for part number identification.

If part number must be reidentified, use the permanent marking pen from the decal/pen box. Mark through the existing part number on the windshield part number/serial number trademark label located on the windshield (see subsequent sketch).

Obtain a fresh disposable towel and an approved glass cleaning solution. Apply cleaner to the towel and thoroughly clean the surface area adjacent to the existing decal. Select the correct new decal, remove it from its backing and apply to the windshield surface as illustrated in the subsequent sketch. Dispose of towel.

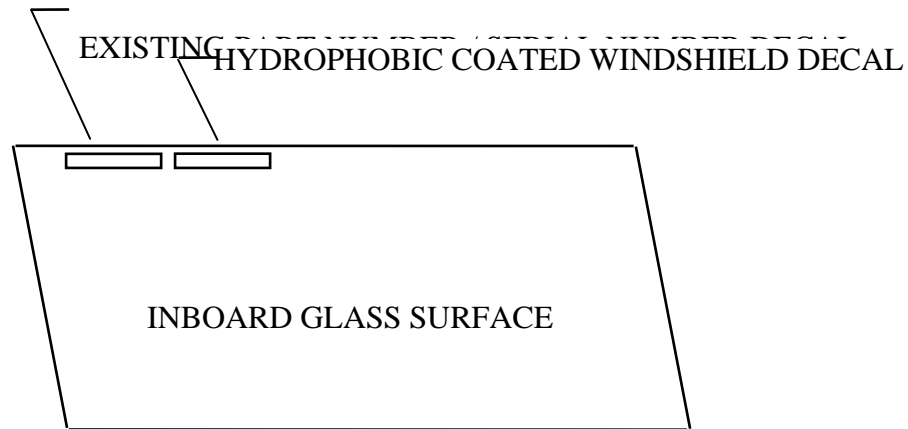


Figure 4 – Decal

6.5 Coating System Removal

If it is decided to remove the coating system from the windshield, a complete cleaning and polishing of the glass surface will accomplish the task, Paragraphs 6.0 through 6.2.1 detail the procedure to be followed for coating system removal.

7.0 INVENTORY AND RESUPPLY

Once the project is complete, take an immediate inventory of all Master Kit contents. Be certain that all equipment and re-usables have been returned to the correct kit locations. As necessary, for reordering kit components or supplies, make photocopies of the order forms included in this document Paragraph 10.0. Complete, mail, FAX, or SITA according to order form instructions.

8.0 MASTER KIT P/N DSS 1040 CONTENTS

<u>Part Number</u>	<u>Description</u>
DSS1041	Packing List/Reorder Form
DSS1042	Maintenance, Assessment, Application Procedures
DSS1023	Video "Coating Efficiency Assessment"
DSS1024	Video "Reapplication and First Time Application"
DSS1025	Material Safety Data Sheets (MSDS) for Kit A and Kit D
DSS1005	Orbital Sander with 115 Volt Charger
or DSS1006	Orbital Sander with 220 Volt Charger
DSS1015	Kit A (2), Application (Chemicals & supplies to coat one windshield-each Kit A for one window only)
	Packing List/Reorder Form
	MSDS Sheets (Surface Prep, Coating Solution)
	Felt Pad in Plastic Bag
	Surface Prep (2) 20 mL Ampules (4.9-SSL-OPR-000,8/31/98)
	Surface Seal® Next Generation Coating Solution (1) 20 mL Ampules (4.9-SSL-OPR-000,8/31/98)
	Applicators (6) in Plastic Bag
DSS1027	Kit D, Master Refill (Replenishable Supplies to Prepare Approximately Ten Windshields)
	Packing List/Reorder Form
	MSDS Sheets (Cleaning Solvent, Polishing Slurry)
	Gloves (100)
	Cleaning Cloths (3 boxes)
	Tape, 1/4" (1 roll)
	Tape, 2" (3 rolls)
	Cleaning Solvent (500 mL bottle)
	Polishing Slurry (500 mL bottle)
	Deionized Water (2), (500 mL bottle)
	Gauze Pads (100)
	Flip-Top Caps (4) For Reusable Bottles
	Disposal Bags (25)
	Plastic Cleaning Pad
DSS1018	Scissors
DSS1048	Container Case for Master Kit
DSS1029	Spray Nozzle
DSS1031	Adapter Plugs
DSS1032	Coated Windshield Identification Decals (30 ea) and Permanent Marking Pen

9.0 CURING KIT CONTENTS

The Curing Kit is windshield specific and consists of the following items.

1. Packing List/Reorder Form
2. Heater(s), 220V for applicable windshield(s)
3. Protective Films (30 ea.) for applicable windshield(s)
4. Container Case for Curing Kit

Applicable DSS part numbers for the specific Curing Kit are included in paragraph 10.4 Curing Kit, or as an enclosure with this document.

10.0 REORDER INFORMATION AND FORMS

The following paragraphs contain reorder forms for the Master Kit (Paragraph 10.1), Kit A - Application, (Paragraph 10.2), Kit D - Master Refill (Paragraph 10.3) and Curing Kit (Paragraph 10.4).

Shipping and Billing Information forms are included as paragraph 10.6.

10.1 Surface Seal Coating System Reorder Form

Master Kit

<u>Reorder</u> <u>Quantity</u>	<u>Part</u> <u>Number</u>	<u>Description</u>
_____	DSS1040	Master Kit Complete
_____	DSS1042	Maintenance, Assessment, Application Procedures
_____	DSS1023	Video "Coating Efficiency Assessment" (Specify PAL, NTSC, or SECAM)
_____	DSS1024	Video "Reapplication and First Time Application" (Specify PAL, NTSC, or SECAM)
_____	DSS1025	Material Safety Data Sheets (MSDS) for Kit A and Kit D
_____	DSS1005	Orbital Sander with 115 Volt Charger
_____	DSS1006	Orbital Sander with 220 Volt Charger
_____	DSS1015	Kit A, Application (For one windshield only)
_____	DSS1027	Kit D, Master Refill (Supplies for approximately 10 windshields)
_____	DSS1018	Scissors
_____	DSS1048	Container Case For Master Kit
_____	DSS1029	Spray Nozzle
_____	DSS1031	Adapter Plugs
_____	DSS1032	Coated Windshield Identification Decal (30 ea) & Marking Pen (Specify windshield P/N, if applicable.)

To reorder kits or components, photocopy this form, write quantities above, and provide to Purchasing source. Send to:

PPG Industries, Inc.
Aerospace Transparencies Sales
P. O. Box 040004
Huntsville, AL. 35804 USA

Or photocopy and FAX this reorder form to: 256-851-8822.

Or SITA: HSVXPCR.

Be sure to include the completed Billing and Shipping Information.

10.2 Kit A, Application Reorder Form

<u>Reorder</u>	<u>Part</u>	
<u>Quantity</u>	<u>Number</u>	<u>Description</u>
_____	DSS1015	Kit A, Application (chemicals and supplies to coat one windshield -each Kit A for one window only)

Kit A Components (Must be ordered as a kit - items are not available separately.)

1. Packing List/Reorder Form
2. Material Safety Data Sheets (MSDS) for Surface Prep and Surface Seal® Coating Solution
3. Felt Pad in Plastic Bag
4. Surface Prep (2), 20 mL Ampules (4.9-SSL-OPR-000,8/31/98)
5. Coating Solution (1) 20 mL Ampule (4.9-SSL-OPR-000,8/31/98)
6. Applicators (6) in Plastic Bag

To reorder kits, photocopy this form, write quantities above, and provide to Purchasing source. Send to:

PPG Industries, Inc.
Aerospace Transparencies Sales
P. O. Box 040004
Huntsville, AL. 35804 USA

Or photocopy and FAX this reorder form to: 256-851-8822.

Or SITA: HSVXPCR

Be sure to include the completed Billing and Shipping Information.

10.3 Kit D, Master Refill Reorder Form

<u>Reorder</u>	<u>Part</u>	
<u>Quantity</u>	<u>Number</u>	<u>Description</u>
_____	DSS1027	Kit D, Master Refill (Replenishable supplies to prepare approximately ten windshields)

Kit D Components (Must be ordered as a kit - items are not available separately.)

1. Packing List/Reorder Form
2. Material Safety Data Sheets (MSDS)
3. Gloves (100)
4. Cleaning Cloths (3 boxes)
5. Tape, 1/4" (1 roll)
6. Tape, 2" (3 rolls)
7. Cleaning Solvent (500 mL bottle)
8. Polishing Slurry (500 mL bottle)
9. Deionized Water (2) (500 mL bottle)
10. Gauze Pads (100)
11. Flip-Top Caps (4) For Reusable Bottles
12. Disposal Bags (25)
13. Plastic Cleaning Pad

To reorder kits, photocopy this form, write quantities above, and provide to Purchasing source. Send to:

PPG Industries, Inc.
Aerospace Transparencies Sales
P. O. Box 040004
Huntsville, AL. 35804 USA

Or photocopy and FAX this reorder form to: 256-851-8822.

Or SITA: HSVXPCR

Be sure to include the completed Billing and Shipping Information Form.

10.4 Curing Kit, Order/Reorder Form

Note: If specific Curing Kit information is not provided here, refer to insert within this document. If no information is enclosed, contact your PPG Sales Representative for more information.

10.5 DSS3000 Coating Efficiency Measurement Kit (Contact Angle)

Reorder Quantity	Part Number	Description
_____	DSS3000	Measurement Kit, Complete
_____	DSS1001	Instruction Booklet
_____	DSS1003	Video, Coating - Efficiency Measurement
_____	DSS1009	Macroscopic
_____	DSS1011	Batteries (2), AA
_____	DSS1013	Eppendorf Repeater
_____	DSS1019	Bottle, 500 mL, Deionized Water
_____	DSS1029	Spray Nozzle
_____	DSS3003	Kit C, Measurement Refill
		<i>(Includes the following)</i>
		Packing List/Reorder Form (1)
		Gloves (50)
		Pipetter Tips (10)
		Cleaning Cloths (1 box)
		Deionized Water (500 mL bottle) (1)
		Post-It™ Note Pad (3"x3") (1)
		Disposal Bags (25)

10.6 Shipping and Billing Information

SHIPPING INFORMATION

SHIP TO:

Name	Title/Department	
Company		
Division		
Address		
City	State	Zip/Postal Code
Country		
Phone		

BILLING INFORMATION

BILL TO:

P.O.#		
Name	Title/Department	
Company		
Division		
Address		
City	State	Zip/Postal Code
Country		
Phone		
Authorized Signature		

When reordering kits or components, include this Billing and Shipping Information, and send to:

PPG Industries, Inc.
Aerospace Transparencies Sales
P. O. Box 040004
Huntsville, AL. 35804 USA

Or photocopy and FAX this form to: (256) 851-8822, Attn: Sales Department
Or SITA: HSVXPCR