

Application of Avery SW-900 Series Films

Instructional Bulletin #4.08 (Revision New)

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Contents

- 1.0 Overview
- 2.0 Benefits
- 3.0 Surface Preparation
- 4.0 Tools & Techniques
- 5.0 Surface Preparation
- 6.0 Application Instructions
- 7.0 Final Squeegee Pass
- 8.0 Confirm Adequate Adhesion
- 9.0 Warranties & Limited Remedy

1.0 Overview

Avery Dennison™ SW-900 Paint Replacement films with Easy Apply RS offer superior conformability to irregular surfaces such as compound curves and corrugations and a paint like finish when wrapping a complete vehicle. This bulletin provides guidelines for applying to these irregular substrates using the SW900 Series of films with the Easy Apply RS adhesive technologies.

IMPORTANT: Documentation of application date, material lot #, and application conditions (temperature, substrate, etc.) are required to support warranty claims in the event of wrap failure.

2.0 Benefits of Avery Dennison™ SW900 Easy Apply RS

Avery Dennison™ Easy Apply RS technology enables an installer to apply graphics with fewer cosmetic issues and limits the risks associated with graphic application such as wrinkling and entrapped air bubbles. In addition to minimizing these risks during application an installer can also re-position material easily within the first few minutes of applying material. If air bubbles occur, it is possible to press them out with relative ease by using a squeegee or finger.

The SW900 Series Paint Replacement Films have a functionally fused laminate applied to the face during the manufacturing process. This process eliminates the need to manually apply additional laminate, thus reducing labor and time during the converting process. The product is ready to use out of the box for typical car wrapping applications.

The Easy Apply RS films have the added advantage of repositionability or slideability of graphics as well as air egress.

3.0 Tools and Techniques

3.1 Traditional Application Tools:

Avery Dennison™ Easy Apply Films can be applied using traditional tools and techniques, special tools are not required. (Refer to Instructional Bulletin #4.00) However, listed below are standard tools used for

vinyl installation, and where available from Avery Dennison and Authorized Distributors identified with the proper part #. Authorized Distributors have these application tools readily available, or can order for specific project requirements.

- Toolbelt – to hold all application tools (Avery part # Z1061)
- Squeegees – a variety of types , aiding in different facets of applications;
 - Blue Squeegee with one felt edge(Avery part # Z1058)
 - Red Flexible Squeegee with one felt edge (Avery part # Z1030)
 - Silver Nylon Squeegee (Avery part # Z1057)
 - Blue Nylon Squeegee (Avery part # Z1007)
 - 100% Felt Squeegee (Avery part # Z1059)
- Low Friction Sleeve or felt strip to cover squeegee edge – to protect graphic during installation
 - Squeegee Sleeves (5 pack) (Avery part # Z1009)
- Knife and Pick Holder (Avery part # Z1012)
- Snitty Vinyl Cutter – safety cutting tool (Avery part # Z1061)
- Light Duty Sharp Retractable Knife with breakaway blades– cutting/trimming tool(Avery part # Z1062)
- Magnets – to hold material in place(Avery part # Z1063)
- Application gloves – heat resistant, for smoothing vinyl (Avery part # ZA114)
- Air release tool – for removing air bubbles (if needed)
- Masking tape– for positioning and assistance holding material in place
- Heat Source (heat gun is recommended for vehicles) – for heating the vinyl on complicated applications and to set vinyl into place after install
- Surface Temperature Thermometer/ IR Thermometer – for checking surface and ambient temperature

3.2 General Application Techniques

As with any technique, the skill of the installer can make a big difference. However, with Avery Dennison™ Easy Apply Films, most installers can achieve high quality results.

- Ensure that the application surface is clean and dry before application of any graphic film.
- Select the proper installation tools.
- Always use adequate pressure and use the hard side of your squeegee to achieve optimal pressure.
- Use firm, uniform overlapping strokes to adhere the film to the substrate
- Post Heat to set graphics, paying close attention to overlap seams, edges, and areas where material has been manipulated to conform to complex shapes.
- Re-squeegee all graphics edges, overlaps, and seams using firm pressure.
- Go over the entire installation by using a heat gun on a medium to high setting. This will identify any areas under the application where bubbles/air may be present (these should be pushed out with your finger, squeegee, or use an air release tool to aid in air elimination) and helps eliminate any scratches caused during the installation.

4.0 Surface Preparation

4.1 Prepare the application surface.

- Car wax and polish residues **MUST** be completely removed.
- Original manufacturer paint is preferred, but if a vehicle has been repainted painted surfaces must be completely dry, hardened and free of scratches. Any residual solvents in paint can affect the performance of the adhesive, and cause outgassing bubbles during application. If a car has been painted or repaired, wait at least one week prior to wrap installation. Contact the paint manufacturer

- for specific instructions regarding the application of film over the newly applied paint, and ensure compatible components are used for each step of the painting/repair. If possible have newly applied paints baked per manufacturer's instructions.
- Testing of an inconspicuous area for paint/clear coat adhesion prior to application over newly painted or repaired vehicles is highly recommended.
- No warranty is provided for damage to paint or clear coat systems other than OEM factory applied original paint systems.
- A clean, dry application surface is absolutely necessary to facilitate the proper bonding of an adhesive to the application surface. Refer to Avery Instructional Bulletins #1.10 Substrate Cleaning and Preparation for Avery specific technical recommendations.

4.2 Application Temperature

- Air, film, and application surface temperature are important and must match the characteristics of the adhesive and film being applied.
- 50° F (10°C) is the absolute minimum application temperature for film, air, and substrate.
- Material applied at the minimum temperature MUST be allowed to set at temperature for a minimum of 24 hours, or until graphics have completely set, verified through visual & physical inspection.
- SW900 Easy Apply Series films have a broad application temperature range (refer to the appropriate product data bulletin).
 - While the film can be applied at the lower end of the temperature range, more pressure will be needed and it will take longer for a functional bond to be achieved during application.
 - Until a "functional" bond is achieved, it is risky to remove premask or allow a vehicle to be transported.
 - Higher heat and humidity conditions may also make a graphic more difficult to re-position once it has made contact with the applications surface.
 - If the air temperature or the application surface temperature exceeds 100°F (38°C), Avery Dennison™ Easy Apply performance may be limited.
- The ability to move trapped air can be adversely affected by the amount of pressure used previously to apply the graphic to the substrate.
- For optimal application performance and ease-of-use characteristics, apply films at a temperature of 70-80°F (21-27°C).
- Allow 24 hours for graphics to fully set prior to placing graphic marked vehicles into service.

5.0 Application Instructions

Avery SW900 films have a high degree of conformability compared to other cast vinyl films. On surfaces with extreme contours Avery SW900 films show excellent results. To achieve these results, the use of an industrial hot-air tool (i.e. heat gun) is needed to improve the ease of application.

Important: After application it is absolutely necessary to post heat parts exposed to stretch, strain or other deformations to obtain its final shape. Post heating will eliminate the applied tensions in the film. The target post heat temperature (for vinyl and substrate) is 175°-194°F (80-90°C)

Avery SW900 films are designed for dry application to prepared surfaces; this application process will be described in this document.

5.1 Application Notes

CAUTION: NEVER use wet application for Easy Apply films.

- Ensure that the application surface is clean and dry before application of any graphic film.
- Be sure the air, film, and substrate are within the temperature range recommended for the film.

- Experiment with what tool and technique works best before applying large graphics. Easy Apply Series films are designed to work with a variety of tools and techniques. Whatever the tools or technique, it is important to use enough pressure to make sure the graphic firmly adheres to the substrate.
- Overlap all strokes by approximately 50%.
- Always ensure your squeegee has a smooth edge without nicks. This ensures a smooth graphic finish after application is completed, and that 100% of the adhesive has made contact with the vehicle substrate.
- If a squeegee is used, hold it at 50-70 degree angle to the surface. The flatter the squeegee the better!
- Locate where to position graphics and mark the spot using small pieces of masking tape.
- If the graphic is large, tape it into position securely with masking tape and use a masking tape hinge method illustrated in Instruction Bulletin #4.00. Magnets can be used in a similar manner.
- Squeegee the film using moderately firm, overlapping strokes. Make sure the material has made 100% adhesive contact with the substrate along the entire length of the stroke.
- Remove air bubbles and tenting around rivets by using an air release tool and heat source.

5.2 Remove air bubbles and tenting around rivets.

- Air bubbles in an installed graphic can be removed easily by applying pressure to the middle of the bubble with your thumb and rub out toward the bubble edges. The air will disperse along the air egress channels. There is no need to make air release holes unless the air bubble is over 1" in diameter. In that case, use an air release tool and remove the air using conventional techniques.
- Tenting around rivets can be handled in one of two ways:
 - 1) Use an air release tool, heat source, and rivet brush. (Reference Section 3 for recommended tools)
 - 2) Press the top of the rivet head down then force air away from the rivet and into the flat area surrounding the rivet head. Use an air release tool and make a small hole to release the air, then heat the film around the rivet. While still warm, press the film down tightly around the rivet head using a rivet brush.
To secure the film around the rivet head, a heat source must be used and work the film in a circular counter clockwise motion back towards the base of the rivet head.

5.3 Compound shaped surfaces:

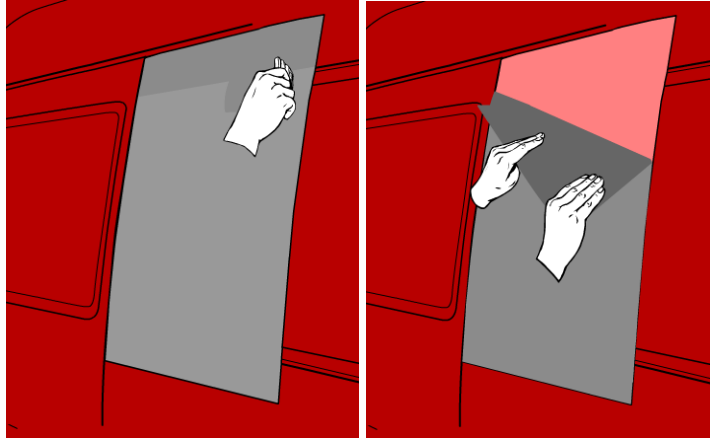
This is generally a complex form of concave and convex shaped surfaces, which can be found one after another or even side by side. In modern models of cars or vans one can find these shapes frequently.

Deep recesses (i.e. Sprinter van window or complex-compound curves on vehicles):

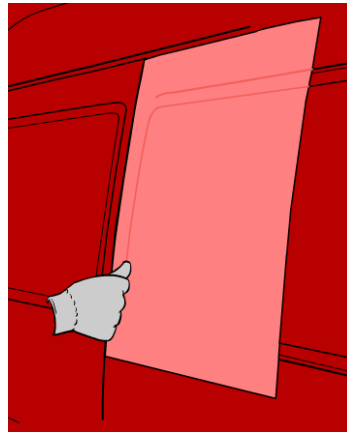
NOTE: The use of a primer coat may aid in the ultimate adhesion and conformability of the graphic in deep channels or compound curved areas. However, primer use does not eliminate the need to properly prepare substrates, and apply graphics to the recommendations made in this bulletin, including but not limited to post heating or setting.

1. Position the film to the application surface with a masking tape that can serve as a hinge (see Instructional Bulletin 4.0). Ensure that the hinge is in a flat section of the surface. Only remove a small area of liner to prevent pre-sticking.
 - Application to this type of surface has to be done systematically; section by section is the best approach. Deviation from this application sequence may result in wrinkles, which are sometimes difficult or even impossible to be eliminated.
2. Start the application at the hinge (continue section by section) and apply the film from the center to the film or graphic edges. This method will limit the occurrence of wrinkles.

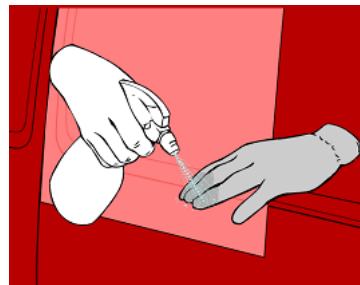
3. While keeping the adhesive free from the substrate, apply the film with a plastic squeegee. Do NOT stretch the film, but follow the irregular shaped surface. Use the full width of the squeegee and press the film firmly down over the entire surface area. Vertical sections should be applied with vertical squeegee strokes. Make sure the film is applied correctly in the edges, corners, seams, etc



4. When edges and corners are re-squeegeed, make sure the material is fixed on the edges of the corrugation (see below), and work your way around the entire corrugation, just fixing the edges.



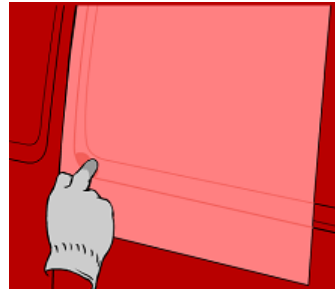
5. Now the application of the material in the corrugation can start. In order to be able to do so without forming wrinkles or creases, it is advised to wet the application glove, using a water/soap mixture.



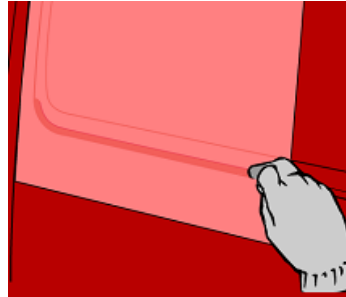
6. The next step is to heat the material gently, using a hot-air gun, to about 105°-125°F (40°-50°C). The use of an IR Thermometer will ensure your hitting this temperature range. It is advised to do small areas at a time.



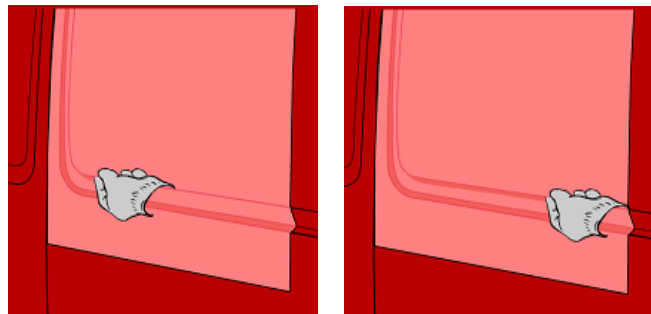
7. Now, start stretching the material in the corrugation, starting in the deepest part of the corrugation first. Make sure that the material is heated to remain at the 105°-125°F (40°-50°C) temperature.



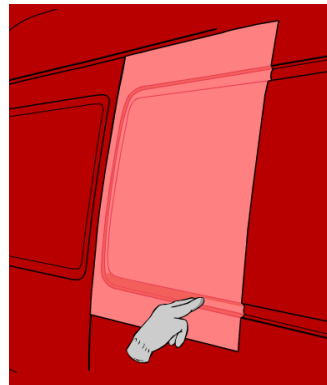
8. Continue your way around the corrugation, only focussing on the deepest part of the corrugation.



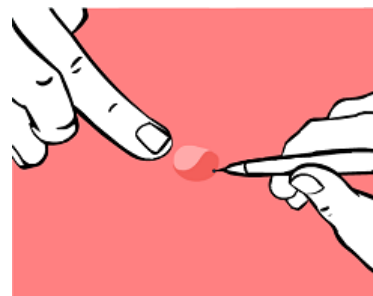
9. When all the deepest parts of the corrugation have been applied, the inside of the corrugation can be done. Again, make sure the material is heated to the required 105°-125°F (40°-50°C), and work your way through the corrugation.



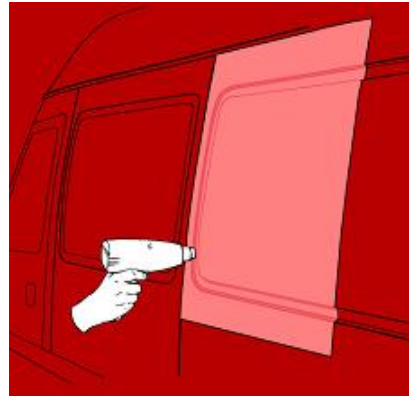
10. With all the edges properly applied, it is necessary to apply the material in the center of the corrugation. When doing this make sure that the air is not trapped, always leave an opening for the air to escape.



11. Check the application for remaining bubbles. If there still are small air bubbles to be seen, these can easily be removed. Just make a small puncture, heat it a little and push the air out.



12. The final stage of the application starts. Using the hot air gun, the material should be post heated to a temperature of 175°-194°F (80-90°C), especially in those areas where the material is stretched. The use of an IR Thermometer or IR Heatgun is **REQUIRED** to ensure you achieve the proper temperature during the post heating process. Make sure that the heating is done gently, and the temperature is gradually increased.



NOTE: It is important that not only the film reaches these temperatures, but also the substrate should be heated to these temperatures. This can best be achieved by re-heating gradually, in stead of a short blast of heat.

- **These procedures must be followed, and applied to all severe complex and compound curves.**
- **Film must be held tight with tension, and no wrinkles, but NOT stretched when applied.**
- **If material is over stretched during application, all warranties are void.**
- **Bottle capping, or edge fingering is a tell tale sign of overstretching film.**

6.0 Final Squeegee Pass. Tips on Good Re-Squeegee Techniques:

NOTE: This is a key final step and will help prevent premature graphic failure due to edge lifting.

- Re-squeegee all graphic edges, overlaps, and seams using firm pressure.
- Use a heat source during this process to ensure edges are sealed properly, attaining temperatures in the range of 175°-194°F (80-90°C).
- Use a squeegee with a low friction sleeve to prevent scratching or damage to the decal.
- Re-squeegee is a must on ALL edges of the decal, including any overlap edges.

7.0 Confirm Adequate Adhesion and Inspect

Ambient temperature is a key environmental factor affecting adhesion of pressure sensitive adhesive films. The warmer the ambient temperature is, the less time it will take the film to achieve adequate adhesion. Temperatures below the recommended low application temperature may take significantly longer, even days, to achieve adequate adhesion.

Until you are comfortable applying the film in various service temperature conditions and using any new application methods or tools, it is recommended that a quick test be performed to ensure that there is no air trapped under the graphic.

- Wait several hours after application before taking the vehicle outside for delivery, enabling the adhesive to reached its functional bond level.
- Using a squeegee with a friction sleeve, rub a small section of the graphic using firm pressure. If air bubbles are apparent and larger than a ½” to 1” in diameter during the test, the application method and/or the temperature used was not adequate.

If the adhesion is not adequate and the graphic must be put into service right away, carefully re-squeegee the graphic (using a squeegee with a friction sleeve). Re-squeegee the film using greater pressure, overlapping strokes, and making sure the applicator is flat with the substrate along the entire length of the stroke. This will help improve the adhesion of the graphic.

Inspect the installation completely verifying all material edges have full adhesion to the substrate, all compound curves have been properly set with heat, and the material has been applied and finished properly.

Whenever possible, move the wrapped vehicle outdoors for natural light or use a well lit interior area to ensure a high quality application has been achieved.

8.0 Warranties and Limited Remedy

This instructional bulletin describes a technique. The information contained herein is believed to be reliable, but Avery Dennison makes no warranties, express or implied, including but not limited to any implied warranty of merchantability or fitness for a particular purpose. To the extent allowed by law, Avery Dennison shall not be liable for any loss or damages, whether direct, indirect, special, incidental or consequential, in any way related to the technique of making a graphic regardless of the legal theory asserted.

Revisions have been italicized.