

Avery Dennison[®] Instructional Bulletin 1.5

Application Instructions for Perforated Window Films

General Information

Avery Dennison Perforated Window Films are digital printable perforated calendered vinyl films with a white face and black back, for use in a wide range of promotional window graphics applications where one way vision, removability and value for money is required. Used on commercial vehicles* for continuous, uninterrupted vehicle graphics by covering window areas, and graphics on building windows that still provide sufficient interior daylight and viewing capabilities.

This instructional bulletin provides information on the key factors for the successful installation of the product.

1.0 Introduction

Avery Dennison Perforated Window Films are designed for use on flat, transparent surfaces such as glass windows, doors, or vehicle windows with slight curves. The film has a continuous perforated hole pattern to provide a graphic visible from the printed side, but can't be seen from the other side, due to the black back of the film. This bulletin provides converting and application recommendations for these films. Testing should be performed prior to application to ensure proper adhesion of graphics to window substrates. If there are any low surface energy coatings present on the substrates (i.e. silicone), loss of adhesion may occur. Refer to Instructional Bulletin 1.01 Substrate Cleaning and Preparation before commencing application of decals.

2.0 Product Description

Avery Dennison Perforated Window Films are comprised of perforated calendered white print face, black back on the adhesive side with a removable clear adhesive on a solid one side PE coated non-perforated kraft paper liner. After printing the Perforated Window Film, the graphic should be overlaminated to protect the image, and to keep water and dirt from accumulating in the holes. Avery Dennison offers three perforated window films. These films should be used only in the appropriate applications where consideration of viewing requirements, minimum VLT % (Visual Light Transmission) and compliance with their specific state or territories traffic and transport regulations.

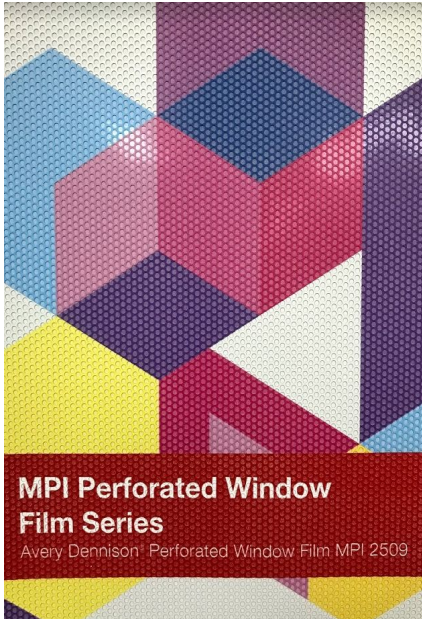
- MPI 2509 Perforated Window 50/50, 50% open area (Larger 2mm hole size)
 - passenger vehicle compliance (meeting minimum 35 VLT%* transport regulatory compliance)
- MPI 2709 Perforated Window 60/40, 40% open area (1.5mm hole size)
 - Transit vehicle advertising, NOT for passenger vehicle applications
- MPI 3709 Perforated Window 60/40, 40% open area (1.5mm hole size)
 - For Architectural window promotional advertising

*Independent testing certification outlining minimum 35 VLT % transport regulatory compliance.

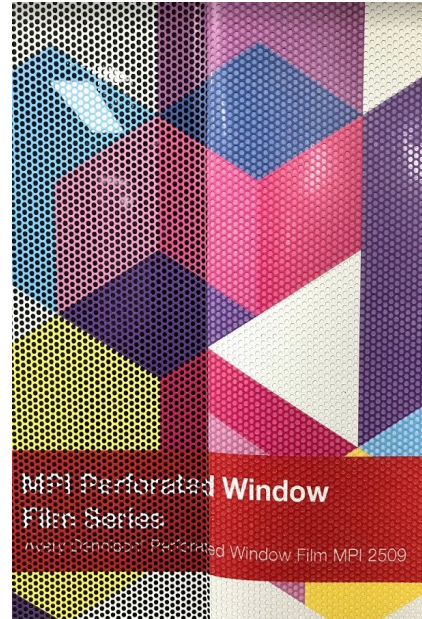
3.0 Digital Inkjet Printing

When printing on Avery Dennison Perforated Window Films, consideration should be given to the visual appearance of the final applied graphics. Due to the perforations, a percentage of the print area will be reduced and may affect colour density, appearance and the legibility of small fonts.

Unapplied, printed MPI 2509
PWF with liner



Partially applied MPI 2509 PWF,
revealing percentage of print
missing in perforations.



When printing, limit the total amount of ink as much as possible, by using the correct ICC profile and RIP settings with a maximum total ink limit of 250% for acceptable print quality, ensuring correct dry and cure temperature for media and environment to ensure the ink is completely cured.

NOTE: Exceeding the maximum ink limit to provide higher ink saturation can result in the ink webbing / connecting in the circular perforations, resulting in the holes appearing blocked or partially blocked with a film of ink.

3.1 Digital Solvent Inkjet Printing

- Reference Instructional Bulletin 4.14 for Printing and Finishing of Digitally Printed Graphics

Drying after Printing

The drying time of the print depends on the type of ink used. The film needs to be dried properly before overlaminating with DOL 6460 High Gloss or DOL 1060Z Gloss. Allow the print to dry for at least 5 days, or until cured before starting further processing. Ensure that the correct drying method is used, and dry solvent inkjet graphics immediately after printing by hanging prints vertically or loosely wound and standing off the ground to allow the solvent to move from the film. Further external fan air flow vertically downwards over the prints, and assist in removing digital solvents and dry the prints. See Instructional Bulletin 4.06 Processing tips for DOL films.

3.2 Digital Latex Inkjet Printing

- Reference Instructional Bulletin 4.14 for Printing and Finishing of Digitally Printed graphics

3.3 Digital UV Inkjet Printing

- Reference Instructional Bulletin 4.14 for “ Printing and Finishing of Digitally Printed graphics “

Note: UV cured ink is prone to block the circular perforations in Avery Dennison perforated window films, thus trialling with your printer and ink prior is recommended.

4.0 Finishing

- The images must be overlaminated with Avery Dennison DOL 6460 High Gloss or DOL 1060Z Gloss Optically Clear laminate Films to maintain clear visibility, in addition to extending the durability, scuff resistance and anti graffiti protection. See Instructional Bulletin 4.06 Processing tips for DOL films. Printed decals must only be overlaminated after the ink has had sufficient time to dry or cure.

Note: Without the DOL 6460 High Gloss or DOL 1060Z Gloss overlaminate, the graphic will be difficult to remove, and reduced visibility may also occur due to environmental conditions, dirt, contamination and water getting trapped in the perforations.

5.0 Preparation of the Application Surface

A clean, dry application surface in good condition is absolutely necessary to ensure the proper bonding of the adhesive to the application surface. Refer to Avery Dennison Instructional Bulletin 1.01 Substrate Cleaning and Preparation, and 1.4 Application Methods for Pressure Sensitive Adhesive Films for specific technical recommendations.

5.1 Application Temperature & Environment

- Application temperature is one of the most critical factors in film application
- Lower temperatures restrict good adhesion properties, which increase the risk of a graphic failure due to low levels of adhesion
- The substrate and ambient temperature must be above 10°C minimum application temperature. For optimal application performance and ease-of-use characteristics, a minimum temperature of 16°C is recommended
- Higher heat and humidity conditions may also make a graphic more difficult to reposition once it has made contact with the application surface

Note: For all products be sure to read the appropriate product data sheet for details about minimum and maximum application temperatures, recommended substrates, and immediate service conditions before and after application.

6.0 Application

6.1 Application Tools

- Tool belt – to hold all application tools
- Microfiber Felt Edge Squeegee, like the following:
 - Squeegee Pro Flexible
 - Squeegee Pro White Teflon
- Cutter/knife with break off blades
- Stainless steel replacement blades
- Snitty
- Heat Gun
- Avery Dennison Surface Cleaner
- Lint-free microfiber cleaning cloth
- Removable painting masking tape i.e. 48mm

6.2 Application Method

- These films must be dry applied (not wet) to a window using Avery Dennison squeegees that are covered with a non-abrasive felt/microfibre edge to prevent scratching.
- Clean the window thoroughly with Avery Dennison Surface Cleaner or Isopropyl Alcohol (IPA) to remove dirt, grime, grease wax, coatings or other contaminants which could affect the adhesion of the pressure-sensitive films. When using IPA, please use two separate cloths (one wet with IPA the other dry), to ensure no residue from the IPA is present during application.

CAUTION: Follow all warnings and safety instructions supplied by the manufacturer of the solvents. See Material Safety Data Sheet for health, safety, and handling information.

Note: DO NOT use Windex, ammonia-based cleaners, commercial detergents with additives (i.e. moisturiser, enzymes, perfumes, lanolin) that can contaminate the application surfaces and reduce adhesion. Measure the decal to be applied and be sure the graphic fits into the window with a clearance around any rubber gasket. At no time should the graphic touch or overlay any window mouldings. Loss of

adhesion causing material failure can occur if material overlaps mouldings. Alternatively, knifeless tape can be positioned next to the window moulding thus allowing a space.

- For windows with no rubber gaskets, where the glass finishes on a glass edge like the rear window, again knifeless tape can be positioned on the inside edge of the glass window, or the decal can be trimmed after application with a knife on the glass bevel edge.
- Use removable masking tape to make a vertical or horizontal hinge at the top centre or the middle of the image to position into place on the window while the liner is still attached
- Flip the graphic using the low tack tape as a hinge and start removing the liner from the graphic, cut the liner with an Avery Dennison snitty, flip the graphic back down close to the glass application surface and start applying squeegee pressure on the film from the center outwards to the edges, creating adhesive contact to the window with. Then flip the remaining graphic, peel back the liner as you squeegee apply to the other edge. If needed, the graphic can be adjusted, carefully lifted shortly after application to realign the material or take out wrinkles, re- squeegeed after repositioning.
- Refer to Avery Dennison IB 1.4 Application Methods for Pressure Adhesive Films for more information.

NOTE: Adhesive lines appear during the application of PWF with DOL overlaminates. This is normal due to the dry application with the clear DOL films visible through the circular perforations on the glass. With time and exposure to outdoor sunlight, these adhesive lines will typically disappear.

NOTE: Wet application methods are not recommended for perforated window film graphics. Water will be trapped in holes causing vision to be obscured when looking through graphics.

- If panels meet edge to edge in the window (overlap), trim edges carefully to form a butt seam (or use knifeless tape). Do not overlap seams or edges. Trimming should be done prior to application. Cutting film on windows may permanently scratch the window, otherwise use knifeless tape.
- All exposed edges and seams of exterior decals must be sealed with edge sealer or with Avery Dennison DOL 6460 High gloss or DOL 1060Z narrow strips of overlaminate film. This will prevent water and contaminants from getting under the film and obstructing viewing or contaminating the adhesive. Sealer or Avery Dennison overlaminate film strips should be applied carefully to completely seal the edges and also to minimize the distortion caused by the sealer when used, from the viewing side of the graphic. Follow all directions of sealer manufacturer to prevent the improper application of edge sealer. Use a 0.25 in. (6mm) brush to apply sealer in order to have greater control and make a neater application.

7.0 Removal Instructions

In order to remove Perforated Window Film that has been overlaminated with minimum damage to substrates, the following methods are recommended. Surfaces treated with abrasion-resistant or anti-reflection coatings may experience some degradation, and as a result, could be affected during removal.

7.1 Removal

- Cold pull, commencing from one edge of the decal, and peel back the graphic removing it off the glass surface.
- Inserting a razor blade, or knife under the corner to loosen the graphic, be careful not to damage the substrate. Grasp the lifted edge and pull up and away from the substrate with a slow even rate at an angle less than 90°.
- If adhesive residue or edge sealer is left on the substrate, follow the instructions below for additional removal tips.

- For vehicle/transit graphics, remove the graphic under warmer warehouse or environmental conditions i.e. 16C or greater, or expose the graphic to outdoor sunlight to aid removal. Avoid removing decals in cold conditions (below 10C) due to the potential breaking of the decal.

Note: The use of wallpaper steamers, heat lamps, and heat guns can assist in heating the decal/adhesive to aid removal, but caution needs to be exercised so that the glass substrate is not damaged with the use of heat.

Note: Caution as thermal shock of glass that can cause glass breakage due to rapid heating from a low cold temperature in winter conditions, with the use of heat.

7.2 Chemical Removal

- The use of chemical removal systems is possible to remove Perforated Window Film which has been clear coated. Such systems can be used on overlaminated material, but the process may not be as effective. Read all instructions as supplied by any chemical removal system manufacturer and pre-test any product with the substrate and surrounding materials to ensure compatibility. Obey all safety, handling, and health precautions supplied by the chemical manufacturer.

Note: If adhesive or edge sealer remains after removal of the film, these may be removed by wiping with a rag saturated with Avery Dennison Adhesive Remover. Let the Avery Adhesive remover soak into the adhesive or edge sealer. Use a plastic squeegee to scrape off the residue. Repeat if necessary. Other non-flammable citrus based removers are available and can be used. Follow all instructions from the manufacturer.

CAUTION: Extreme caution should be used to avoid fracturing, shattering, or cracking of glass substrates. **DO NOT** overheat. Use caution with flammable products. Do not use heat gun, heat lamp, open flames or other electric equipment in close proximity to solvent mixtures, vapors, or residues. Follow all manufacturers' instructions and review health and safety information.

For further information, contact your local Avery Dennison representative.

Warranty 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.

The above information provides basic information on how to apply pressure-sensitive films. The instructions are designed to help ensure success across a broad range of applications. Depending on the size and complexity of applications, a certain amount of expertise is needed.

Professional applicators can be hired to ensure proper application of finished graphics. When installing films in remote geographic areas, professional applicators can offer the added benefit of local service.

Avery Dennison has a vast network of Specialist Installers who have been specially trained and certified in accordance with our recommended techniques.

You can review the Specialist Installer list here:

<https://graphicsap.averydennison.com/en/home/where-to-buy/graphics-installers.html>

Consider hiring a professional whenever the application requires:

- Complex surfaces, such as rivet and corrugated trucks
- Harsh environmental conditions (i.e. outdoor applications in high heat climates)
- Remote geographic locations

For further information, contact your local Avery Dennison representative.