



# Application

## Wet Method for Translucent Screen Printed, Thermal Mass Transfer and Cut Graphics

Note: For information about making backlit signs with digitally-printed graphics, refer to Instruction Bulletin 4.26.

### Description

This bulletin shows you the general wet (detergent and water) application method for applying films to a variety of flat surfaces. Use these instructions in conjunction with any other related Product and Instruction Bulletins.

Note: The application technique described in this bulletin is not recommended for any vehicle applications or for compound-curved, textured, rough or ribbed surfaces.

### Compatible Products

- 3M™ Scotchcal™ Translucent Graphic Films:
  - Series 210
  - Series 230
  - Series 3630
  - Series 3632GPS
  - Series 7725SE
- 3M™ Translucent Intermediate Graphic Film Series 1330

### Compatible Substrates

- 3M™ Panaflex™ Awning and Sign Facing 945GPS
- Glass
- Acrylic
- Polycarbonate
- Copolyester sign sheet
- Butyrate
- Fiberglass
- Other 3M films; see the film's Product Bulletin for any restrictions.

### Health and Safety

#### **Caution**

When handling any chemical products, read the manufacturers' container labels and the Material Safety Data Sheets (MSDS) for important health, safety and environmental information.

To obtain MSDS sheets for 3M products:

- By fax, call 1-800-364-0768 in the US and Canada or 1-650-556-8417 for all other locations.
- Electronically, visit us at <http://www.3M.com/MSDS>.
- By mail, or in case of an emergency, call 1-800-364-3577 or 1-651-737-6501.

When using any equipment, always follow the manufacturers' instructions for safe operation.

## Tools and Materials

- 3M™ Applicator PA-1 (Blue or Gold)
- 3M™ Air Release Tool 391X
- Scotch™ Masking Tape 232
- Razor Blades/Cutting Knives
- Small container of mild detergent (such as Dawn®) containing no lotions, soaps, oils, waxes or enzymes.
- Spray Bottle or Plastic Garden Sprayer
- Large, High-Quality Window Squeegee—Recommended for large graphics.

## Temperature

Apply the film when the air and application surface temperature is at least 60° F (16° C) and within the application temperature range specified in the film's Product Bulletin.

## Application Tapes

The type of application tape to use depends on the particular construction of your graphic. See your film's Product Bulletin and Instruction Bulletin 4.3 for details on selecting and using application tapes.

- Premasking is not required with a wet application; however, if you choose to premask the film, use a compatible premasking tape.
- Use a compatible prespacing tape when applying graphics that are prespaced on a liner.

## Registration Marks

If the film is not premarked for registration, you can make your own registration marks using a lead pencil, marking pen, or small pieces of masking tape.

Note: DO NOT use chalk, chalk line, or a grease pen. Film will not adhere to chalked areas or those marked with a grease pen.

## Matching

Whenever two or more pieces of the same color translucent film are seamed together as a continuous band of color, they should be matched to assure uniform daytime color and transmitted night appearance.

Material from a single roll or lot must be used on a single graphic or sign for identical color matching.

In general, translucent film from a roll can be matched as shown in Figure 1. The dark line represents one edge of the film.

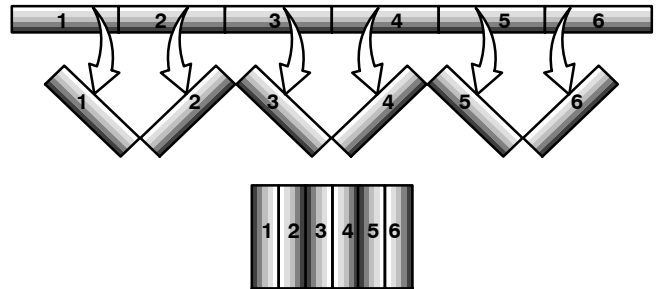


Figure 1. Matching

Note: The matching edges are always swung to meet each other. Panels 1 and 2 are a matched set. Pieces 1, 2 and 3 are matched, etc. By following this method you can match as many sheets from a roll as are required for any size sign. Exact color match between different run numbers should not be assumed.

## Substrate-Specific Information

### Glass

#### Caution

The risk of glass breakage increases when large, dark-colored areas of glass are exposed to direct sunlight.

Avoid using large areas of black, duranodic, or other dark colors on glass that is exposed to direct sunlight.

### Polycarbonate

Before applying film to a polycarbonate substrate, make sure the substrate is oven dried according to the manufacturer's recommendation. If polycarbonate is not oven dried, it may emit moisture that can cause the film to bubble.

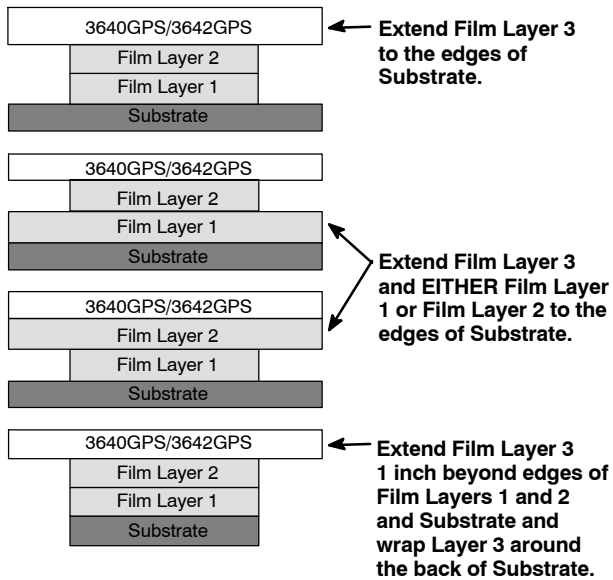
Note: For the full product names of the 3M products listed on this page, please see page 1 and 2.

## Film Applied over Film

You can apply new film over one layer of existing film as long as the existing film is in good condition and is prepared as directed. Do not apply new film over more than one layer of existing film, except as noted under “Important Note.”

### ✔ Important Note

A third layer of film on any one surface is warranted *only* if the top layer is 3M™ Scotchcal™ High Gloss Overlaminates 3640GPS or Matte Overlaminates 3642GPS and no more than two layers of any film are even with the edges of the substrate. Therefore:



## Awning and Sign Facing 945GPS

If you plan to mechanically tension the sign facing, you can tension it before or after you apply the film. If you are applying the film before tensioning, extend the film beyond the point where the substrate will contact and be secured around the attachment hardware to ensure that the film does not lift off during tensioning.

Refer to Product Bulletin 945GPS for additional application information specific to the sign facing, and refer to Instruction Bulletin 6.3 for information about sign construction and substrate tensioning.

## Sign Boxes and Frames

Constant rubbing of retainers or other parts of a sign body may tear the film: you can reduce damage by removing a 1/8 inch (0.3 cm) or wider border of film around the edges of the substrate or by applying a clear protective tape to the edges.

## Key Application Tips

- **Clean work area.** Make sure the work surface and surrounding area are properly cleaned to avoid contaminating the graphics.
- **Temperature.** Make sure the film, air and surface temperatures are at least 60° F (16° C) and are within the application temperature specified in the film’s Product Bulletin. If you are applying a graphic at or near the minimum application temperature, the adhesive bond will develop more slowly than in higher temperatures. Thoroughly resqueegee the graphic as directed in the application procedure.
- **Handling paper liners.** If you are using film with a paper liner, DO NOT allow the liner to get wet before removing it from the film. A wet liner is difficult to remove. Refer to the film’s Product Bulletin to find out whether the film has a paper liner.
- **Seams and overlaps.** Seams can be made using the overlap method. See page 6.
- **Squeegeeing tools and techniques.** Use plastic applicator PA-1 that is smooth and not nicked. A large window squeegee may be used to remove the water solution. However, an applicator PA-1 with a low friction sleeve SA-1 must be used with firm, overlapping strokes. Re-squeegee the graphic after 24 hours.
- **Air bubbles.** Puncture air bubbles with an air release tool or pin as described on page 5. Do not use a knife or razor.
- **To remove an application tape,** if used, always remove it at an angle as close as possible to 180 degrees and immediately re-squeegee the film.
- **Cut and weed** soon after application as adhesion builds with time. See page 8.
- **Keep newly fabricated sign faces out of direct sunlight for at least 24 hours.** This allows any remaining moisture to dry evenly without wrinkling the film.

Note: For the full product names of the 3M products listed on this page, please see page 1 and 2.

## Application Procedure

### Prepare a Detergent-Water Solution

Prepare a solution of 1/3 teaspoon (2 ml) of concentrated detergent, containing no lotions, soaps, oils, waxes or enzymes, for each 1 quart (1 liter) of clean, cool water. One quart of solution is usually enough to complete a single small- or medium-sized graphic.

After mixing the solution, pour some or all of it into a spray bottle.

### Clean and Prepare the Substrate

Refer to Instruction Bulletin 5.1 for details on how to clean and prepare the type of substrate you plan to use.

#### Caution

Any activity performed for a long period of time in an awkward position or with a high amount of force is potentially a risk for causing musculoskeletal strain, pain or injury. When applying graphics, follow these practices to improve comfort and avoid injury:

- Alternative your tasks during the application.
- Schedule regular breaks.
- Perform stretches or do exercises to improve circulation.
- Avoid awkward reaching.

### Apply the Film

Note: This procedure does not provide information about overlaps. If you need to overlap multiple pieces of film, read through the Film Overlaps section beginning on page 6 before you start applying the film.

Note: If you are using a film with a paper liner, keep the liner dry until you are ready to remove it.

1. If possible, lay the substrate face up on a clean surface.
2. Spray the substrate with solution.
3. Wipe off the film with a clean, lint-free cloth.
4. Lay the film, liner side up, in a dry location near the wetted surface.
5. Lift one corner of the liner while spraying the solution onto the exposed adhesive. See Figure 1.

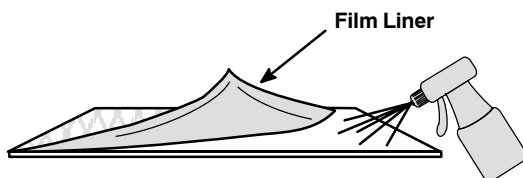


Figure 1. Lift Corner; Spray Solution

6. Continue to remove the liner and spray the solution. By the time the liner is completely removed, the entire adhesive surface should be wet. Spray on more solution, if necessary.

Note: Depending upon the size of the graphic, you may need another person to help you complete the next step.

7. Lift and turn over the film, adhesive side down, onto the wetted substrate and correctly align with any registration marks. See Figure 2.

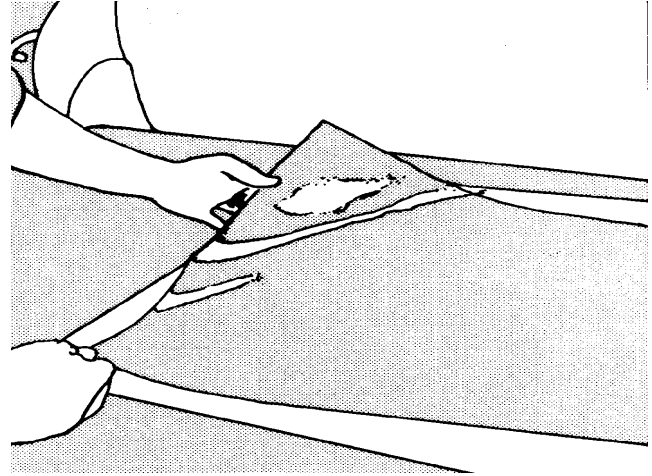


Figure 2. Lifting and Turning over the Film

8. If the film does not have a premask on it, thoroughly spray the top of the film with the solution to reduce friction when you squeegee the film.
9. To smooth out wrinkles or bubbles on a small section of film, use gentle, overlapping strokes of the plastic applicator and sleeve from the center of the graphic out to the edge. See Figure 3.

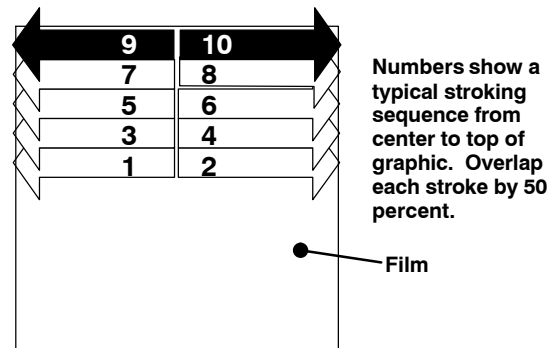
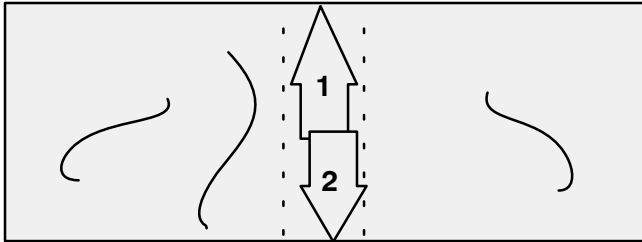


Figure 3. Smoothing a Small Graphic

Note: For the full product names of the 3M products listed on this page, please see page 1 and 2.

10. To smooth out wrinkles on a large section of film:

- a. Use a large window squeegee and very light pressure to smooth out the entire graphic, starting at the center and working toward the edge, in the order shown in Figure 4. When you finish this step, the film should be flat on the substrate and most of the water pushed out.



**Figure 4. Squeegeeing the Center of a Large Graphic**

- b. Use a small squeegee and firm, overlapping strokes to resqueegee from the center of the graphic to the edges. When you finish this step, all of the water and as many bubbles as possible should be removed.

11. If the film does not have a premasking tape on it:

- a. Spray the entire top of the film with more solution.
- b. Use the applicator to apply firm pressure to the entire graphic, beginning in the center and working toward the edges in overlapping strokes.
- c. Wipe dry the entire surface.

12. If the film has premasking tape on it:

- a. Use the applicator to apply *firm* pressure to the entire graphic, beginning in the center and working toward the edges in overlapping strokes as in Step 9.
- b. Wait 15 to 20 minutes, depending upon the substrate temperature, for adhesion to build.

Note: Do not leave the premasking tape on the graphic for more than 24 hours after application.

- c. Begin at a corner and carefully pull away the premask from the film at a 180 degree angle.
- d. Use the applicator to apply firm pressure again to the edges of the film.

Note: When you remove the premasking tape from a graphic, the pulling force loosens the adhesive at the edges of the graphic, particularly when the graphic is applied at or near the minimum application temperature. It is imperative that you resqueegee the edges after removing the premasking tape.

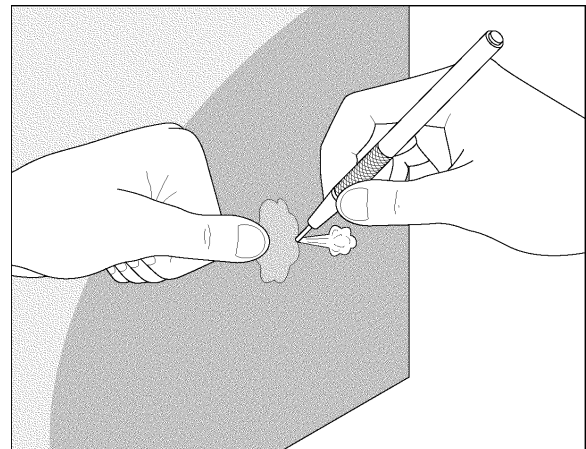


## Caution

When using any equipment, always follow the manufacturers' instructions for safe operation.

13. Remove any remaining bubbles from the film:

- a. Puncture the film at one end of the bubble with the air release tool or a pin. Do not use a razor or blade.
- b. Use your thumb to push the trapped air or wetting solution toward the puncture. See Figure 5.



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**Figure 5. Removing Bubbles from the Film**

14. If necessary, cut and weed the graphics as described on page 8 within 90 minutes. The adhesive bond builds with time and weeding becomes more difficult after 90 minutes.

15. Keep the newly applied graphic out of direct sunlight for 24 hours.

16. After 24 hours:

- a. Spray the top of the film with the wetting solution.
- b. Use a squeegee with a low friction sleeve to re-squeegee the film.

Note: For the full product names of the 3M products listed on this page, please see page 1 and 2.

## Film Overlaps

When it is necessary to join pieces of film, always use an overlap, not a butt seam, which can cause a light leak. The recommended overlap is 1/8 inch (0.3 cm). The overlap will leave a scarcely noticeable darker line when viewed at a short distance.

To create an overlap, use the following procedure.

Note: In a horizontal seam the upper panel should overlap the lower panel.

### Materials Needed

- 2 inch (5.1 cm) wide masking tape 232.
- A cutting strip made from scrap plastic:
  - **Width:** 1 to 1-1/2 inches (2.5 to 3.75 cm)
  - **Thickness:** 1/4 inch (0.6 cm), which results in a 1/8 inch (0.3 cm) overlap
  - **Length:** as long as the seam
- Sharp knife or razor blade in a safety holder.

### Procedure

1. Determine where the film overlap will occur.
2. Lay the cutting strip on the sign surface at the film overlap location.
3. Tape the cutting strip to the sign surface with 2 inch (5.1 cm) masking tape 232. See Figure 6.

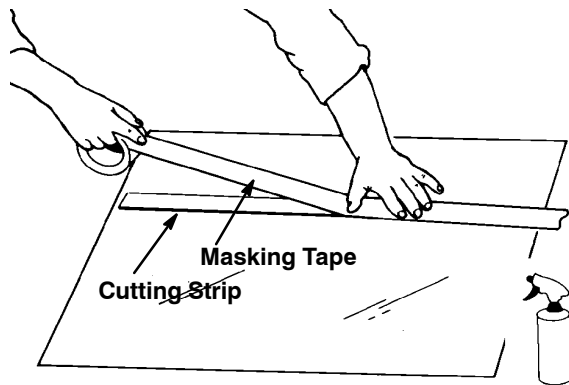


Figure 6. Taping Cutting Strip to Sign Surface

4. If the film pieces are premasked, remove the premasking tape in the overlap region (approximately the first 1 inch along the overlapped edges).

5. Using the wet application procedure (beginning on page 4), apply the first piece of film, making sure that it overlaps the cutting strip. See Figure 7.

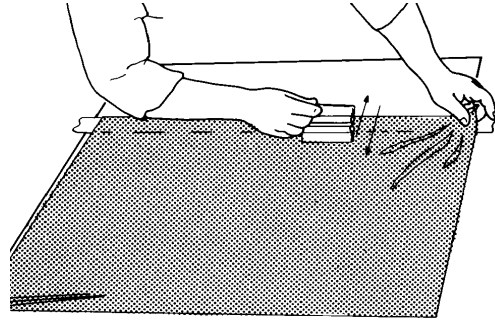


Figure 7. Applying the First Piece of Film

6. Apply the second piece of film, making sure that it is wide enough to overlap the width of the cutting strip. See Figure 8.

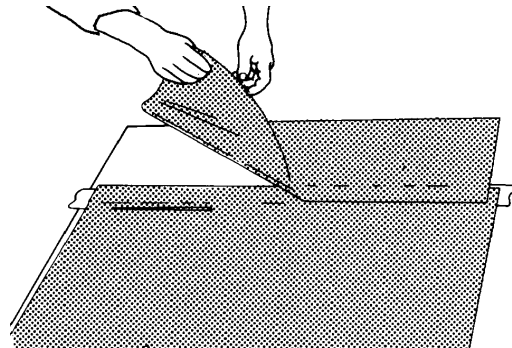


Figure 8. Applying the Second Piece of Film

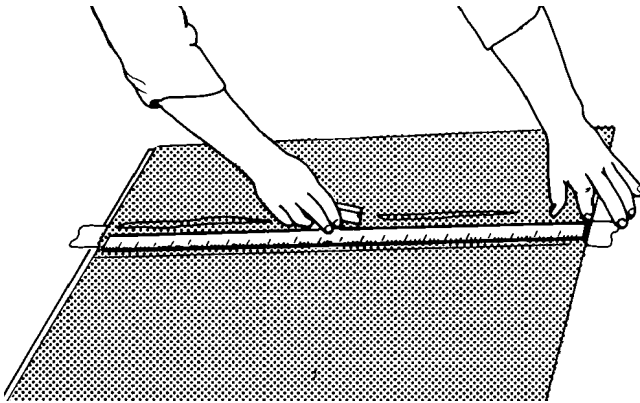
7. Squeegee both pieces together.

Note: For the full product names of the 3M products listed on this page, please see page 1 and 2.

 **Caution**

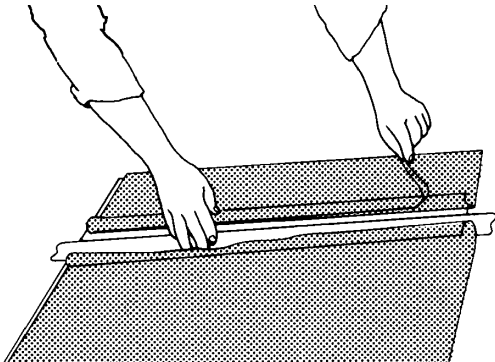
When using any equipment, always follow the manufacturers' instructions for safe operation.

- Using a sharp knife or razor in a safety holder and a straight edge, cut along the entire length of the overlap through both layers of film. See Figure 9.



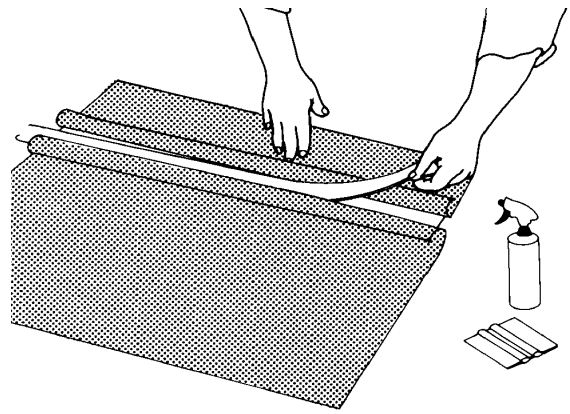
**Figure 9. Cutting Through Two Layers of Film**

- Remove the top film weed.
- Fold back the overlapped film so that the bottom film weed can be removed.
- Remove the bottom film weed. See Figure 10.



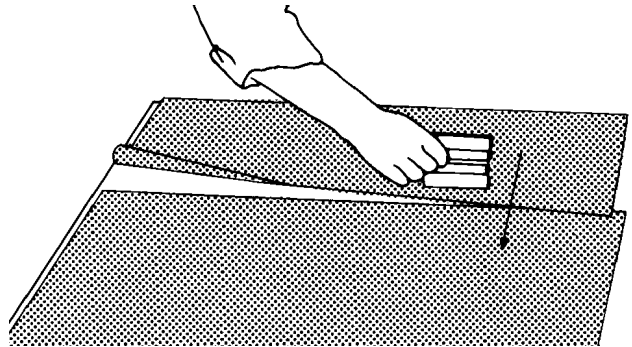
**Figure 10. Removing the Film Weeds**

- Remove the taped down cutting strip. See Figure 11.



**Figure 11. Removing the Taped Down Cutting Strip**

- Apply solution where the cutting strip has been removed.
- Squeegee the first piece of film onto the substrate and then squeegee the second piece of film. A natural overlapped seam will be created. See Figure 12.



**Figure 12. Squeegeeing the Second Piece over the First**

Note: For the full product names of the 3M products listed on this page, please see page 1 and 2.

## Cutting and Weeding

If possible, cutting and weeding should be performed before application to prevent damage to the substrate. However, if necessary, you can cut and weed within 90 minutes after application. The adhesive bond builds with time and weeding becomes more difficult after 90 minutes.

### **Caution**

When using any equipment, always follow the manufacturers' instructions for safe operation.

### **Caution**

Heat or open flames may contribute to a flash fire or burns. Follow these precautions when using a heat source for flame treating.

- Read and follow the instructions supplied with the heat source.
- Avoid personal contact with the heat source. Wear heat-resistant gloves and safety glasses.
- Do not use heat sources near solvent mixtures or residues, or where solvent vapors may be present.

### **Caution**

Always provide adequate ventilation to remove emissions that may result from the use of heat. Failure to provide adequate ventilation can result in operator exposure.

- Cut with a conventional fixed or swivel graphic knife or a sharp razor blade in a safety holder.
- You can make patterns on the surface of the applied film by pouncing with chalk or carbon dust. (Some carbon papers and marking pens permanently mark the film, so check suitability before using them.)
- Avoid or minimize over-cuts to eliminate or reduce light leaks.
- To weed, carefully hold a corner of the weed at a 90 degree angle and pull it with sharp, short jerks.
- If necessary, warm the surface slightly to ease weeding and reduce adhesive transfer to the substrate. Very little heat is required. For instance you can use a low-wattage heat gun or place the back side of the substrate on a 100° F (38° C) surface for 10 seconds.
- Remove any adhesive residue on the substrate by rubbing it with your thumb or finger.

## Warranty and Disclaimers

The information contained and techniques described herein are believed to be reliable, but 3M makes no warranties, express or implied, including but not limited to any implied warranty of merchantability or fitness for a particular purpose. 3M shall not be liable for any loss or damages, whether direct, indirect, special, incidental or consequential, in any way related to the techniques or information described herein.

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An e-mail will be sent when your authorization is completed.
-

## 3M Related Literature

Before starting any job, be sure you have the most current product and instruction bulletins.

The information in 3M bulletins is subject to change. Current bulletins, as well as a list of all bulletins updated within the last three months, are available at [www.scotchprint.com](http://www.scotchprint.com) or through our Fax-on-Demand system. Any warranty, if offered, is based on information in the bulletin that was current at the time you purchased the 3M products. The following bulletins provide the information and processes you need to properly make the graphics described in this bulletin.

Fax-on-Demand phone numbers:  
 United States or Canada: 1-800-364-0768  
 International: 1-651-732-6506

Subject	Bulletin No.	FOD No.
<b>Product Bulletins</b>		
3M™ Scotchcal™ Translucent Graphic Film Series 210	210	3001
3M™ Scotchcal™ Translucent Graphic Film Series 230	230	3002
3M™ Translucent Intermediate Graphic Film Series 1330	1330	3033
3M™ Scotchcal™ Translucent Graphic Film Series 3630	3630	3009
3M™ Scotchcal™ Translucent Film Series 3632GPS	3632	3023
3M™ Scotchcal™ Graphic Film Series 3650	3650	1509
3M™ Panaflex™ Awning and Sign Facing 945GPS	945	4006
<b>Instruction Bulletins</b>		
Application, substrate selection, preparation and substrate-specific application techniques	5.1	7001
Application, special applications and vehicles	5.4	7004
Making backlit signs with 3M digitally imaged graphics	4.26	6526
Application, general procedures for interior and exterior dry applications	5.5	7005
Using 3M application tapes; premasking and prespacing for films	4.3	6503
Using 3M™ Wedge Clamp System	6.3	7503
Storage, handling, maintenance, removal	6.5	7505
<b>Warranties</b>		
Worldwide 3M™ MCS™ Warranty		9503

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### Bulletin Change Summary

Updated recommendations for the application tapes. 3M™ Panaflex™ *Enhanced Image* Sign Facing 645EI has been discontinued. Other changes are noted by black bars in the margins.



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