



# Scotchcal™ Perforated Window Graphic Film

## IJ8171, RG8171\*

### For Solvent Inkjet Printing Only

#### 1. Product Description

This 4-mil film allows a full image to be seen on the outside while allowing viewing through windows from the inside. A 50 percent perforation pattern enhances light transmission for a good balance of viewing through the window and image density as viewed from the outside. This short-term, removable, first surface film is designed for solvent inkjet printing.

\*Film RG3650-114 is available for purchase and use with only a 3M Basic Product Warranty on a customer test and approve basis.

#### 2. Recommended Types of Graphics and End Uses

When constructed and used as described in this Bulletin, these types of graphics and end uses may be warranted by the [3M™ MCS™ Warranty](#). Please read the entire Bulletin for details.

- Store and other architectural windows
- Graphics for non-regulated vehicle windows
- Application to metal areas less than 2 inches wide between windows if they are covered with 3M brand vinyl graphic film or are painted

#### A. Limitations of End Uses

This 3M product is not designed or recommended for the following uses. Please contact us to discuss other options.

##### (1) Unsuitable End Uses for This Product

- Wet film application method
- Film is used without graphic protection
- Graphics applied to:
  - Surfaces other than vertical windows
  - Windows that have built-in heating, defrosting elements or wipers
  - Windows with coatings such as anti-reflection and scratch resistance; such coatings may be damaged during film removal
  - Windows that crank or roll down.
  - Use on any regulated vehicle window
- Applications that in any way restrict the safe operation of emergency windows.
- Graphic removal
  - From substrates with coatings such as anti-reflection and scratch resistance; removal may damage such coatings
  - More than 1 year after application

#### 3. 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 go to [3M.com/MSDS](http://3M.com/MSDS), or 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.

## A. Compliance with Safety Regulations and Laws

3M Commercial Graphics Division policy is not to support applications of perforated window graphic film when a driver's view is obstructed, which may include non-vertical windows, and/or where local laws prohibit its use.



**CAUTION**

Some states have laws or regulations requiring minimum light transmission that may limit or preclude the use of this product on regulated vehicle windows, which may include passenger vehicles and vans. The user is responsible for determining and complying with all applicable standards.



**WARNING**

Applications that require an optically-clear view, such as vehicle window exteriors, must be laminated with 3M™ Scotchcal™ Optically Clear Overlamine 8914. Failure to apply this overlamine could result in obstructed or impaired viewing when the product becomes wet.

### (1) Special Bus Application Safety Information

The Office of Vehicle Safety Compliance of the U.S. National Highway Traffic Safety Administration (NHTSA) has asked for 3M's assistance in communicating an important safety concern. NHTSA has observed that graphic films used for bus wraps could be, and in some cases have been, applied in such a way as to block or restrict emergency window exits. Specific instructions for graphic installers on how to avoid such problems are provided in the most current release of 3M [Instruction Bulletin 5.4](#).

#### a. Penalties for Non-compliance

Failure to trim film away from rubber gaskets surrounding emergency exit windows can render an emergency exit inoperable. This is a violation of Title 49 United States Code section 30122. Substantial civil penalties as set forth in Title 49 United States Code section 30165 may be incurred for such a violation.

## 4. Compatible Products

This Bulletin provides details about the base film, **recommended construction options, warranted durability and warranty limitations for the constructions shown in the Warranted Durability Tables**. Additional specific information about compatible products can be found in the Product and Instruction Bulletins listed in **3M Related Literature** at the end of this bulletin.

### A. Solvent Inkjet Inks and Printers

#### Ink Series

#### Printer

- 3M™ Piezo Inkjet Ink Series 1500v2    EFI™ VUTEK® 150, 2360/3360, 3300/5300 and 3000/5000 Printers
- 3M™ Piezo Inkjet Ink Series 4400    HP XLJet 1200 and 1500 Printers

### B. Graphic Protection

- 3M™ Scotchcal™ Optically Clear Overlamine 8914  
*Provides optical clarity as well as graphic protection from environmental factors such as dust, water and dirt that may collect in the perforations. Required on certain windows.*
- 3M™ Scotchcal™ Gloss Overlamine 8518

## 5. Characteristics

These are typical values for unprocessed product; processing may change the values. Contact your 3M representative for a custom specification.

### A. Physical Characteristics

Characteristic	Value
Film	Cast vinyl
Color	White on the image side, black on the reverse side
Gloss	High gloss
Film thickness	<b>Without adhesive:</b> 4 mils (0.10 mm) <b>With adhesive:</b> 5-6 mils (0.13-0.15 mm)
Liner	Polyethylene-coated paper with a clear film backing
Adhesive	Pressure sensitive, removable
Adhesive color	Clear
Tensile strength	4.2 pounds/inch (0.74 kg/km) <i>minimum</i>

Characteristic	Value
Flammability	Unprocessed film perforated window film has been tested for flame spread per ASTM E84, "Surface Burning Characteristics of Building Materials," and the results show that the material meets the requirements of National Fire Protection Association Class A as defined in NFPA 101, "Life Safety Code."

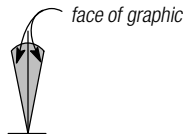
**B. Application Characteristics**

Characteristic	Value
Finished graphic application recommendation	<p><b>Surface type:</b> Flat or simple curves</p> <p><b>Substrate type:</b> Transparent substrates such as transparent acrylic, glass, polycarbonate; 3M vinyl films; painted metal between vehicle windows</p> <p><b>Application temperature:</b> 40° to 100°F (4° to 38°C)</p> <p><b>Application method:</b> Dry</p>
Temperature range after application	-30° to 150°F (-34° to 65°C)
Removal	<p>Removable with heat for up to 1 year on glass, acrylic, polycarbonate</p> <p><b>Removal temperature:</b>                      Glass: 60° to 100°F (16° to 38°C)                      Acrylic, polycarbonate: 70° to 100°F (21° to 38°C)</p>

**6. Definitions**

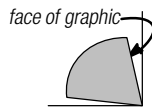
**A. Exposure**

**U.S. Vertical Exposure**



The face of the graphic is +/- 10° from vertical.

**U.S. Non-vertical Exposure**



The face of the graphic is greater than 10° from vertical and greater than 5° from horizontal. This includes non-vertical surfaces of vehicle wraps or fleet graphics.

**U.S. Desert Southwest Exposure**

Any outdoor graphic exposed to solar energy more than half of the daylight hours in Arizona, New Mexico and the desert areas of California, Nevada, Utah and Texas is subject to reduced warranties. A detailed map is available at 3Mgraphics.com under Warranties.

**B. Finished Graphic**

A graphic that has been manufactured, used and installed according to 3M specifications is considered fully finished.

**C. Graphic Construction**

The products used to make a graphic, which may include film and/or flexible substrate, graphic protection, ink, printer and application tape.

**D. Graphic Protection**

Overlaminated films or clear coats used to protect the graphic and/or change gloss.

**E. Graphic Types**

**Indoor Signs** Stationary graphics applied indoors and *not* exposed to the elements.

**Outdoor Signs** Stationary graphics applied outdoors and exposed to the elements.

**F. Removable with Heat**

Film is removable when heat is used within the specified time period and leaves no more than 10% adhesive residue on flat and simple curves without rivets, and no more than 30% adhesive residue on rivets and corrugations.

**G. Vehicle**

**Fleet Trucks and Trailers** Straight trucks, semi-tractors and trailers used in commercial fleets. Excludes air shields.

**Commercial Vehicle** Buses, vans, automobiles, trucks and trailers (except those defined as Fleet Trucks and Trailers) that are used for commercial business purposes

<b>Recreational Vehicle (RV)</b>	Vehicles used for personal pleasure, such as campers, motor homes and trailers, that are not used in connection with any commercial or business enterprise. 3M specifically excludes watercraft from this definition.
<b>Personal Vehicle</b>	Vans, automobiles, pickup trucks and trailers primarily for personal use

## 7. Warranty Information

### A. Limitations and Disclaimers Applicable to All Warranties & Warranty Coverage Overview

Both the warranty coverage and the durability for each graphic is based on the user(s) reading and following all applicable and current 3M Product and Instruction Bulletins. 3M will honor the Warranted Durability stated in the base film or substrate Product Bulletin that is current when the film was purchased. Warranted durabilities may be reduced and stipulations may apply for certain constructions and applications, as covered in this Bulletin.

The following is made in lieu of all other express or implied warranties, including any implied warranty of **merchantability** or fitness for a particular purpose or implied warranty arising out of a course of dealing, custom or usage of trade. 3M will replace or refund the price of any 3M materials that do not meet this warranty within the specified time periods. These remedies are exclusive. **In no case shall 3M be liable for any direct, indirect, or consequential damages, including any labor or non-3M materials charges.**

See the [3M Commercial Graphics Warranty Brochure](#) at 3Mgraphics.com, which gives the terms, additional limitations of the warranty, if any, and limitations of liability.

### B. 3M Basic Product Warranty

All 3M products are warranted to be free of defects in materials and manufacture at the time of shipment and to meet the specifications stated in this Product Bulletin and as further set forth in the 3M Graphics Market Center Warranty Brochure.

### C. 3M™ MCS™ Warranty

Subject to Stipulations set forth in Section D., below

Finished graphics constructed with the materials specified and the exposure specified in the Warranted Durability Tables, Section C.(1), is eligible for the 3M™ MCS™ Warranty. For warranties for other exposures, see Section D.(1).

#### (1) Warranted Durability Table for Finished Graphics in a Standard U.S. Vertical Exposure

Vehicle = Fleet and Standard Vehicle Graphics  
Outdoor = Outdoor Signs  
Indoor = Indoor Signs

*Warranted Durability, In Years*

	VUTEk 150, 2360/ 3360, 3300/5300, 3000/5000 Printers			HP XLJet 1200 and 1500 Printers		
<b>Ink Series</b>	<b>SOLVENT Ink Series 1500v2</b>			<b>SOLVENT Ink Series 4400</b>		
<b>Graphic Protection</b>	Vehicle	Outdoor	Indoor	Vehicle	Outdoor	Indoor
8914	1	2	5	1	2	5
8518						

### D. General Warranty Stipulations for 3M™ MCS™ Warranty

These stipulations apply to graphics covered by the 3M™ MCS™ Warranty. Specific provisions of these stipulations are found in the [3M Commercial Graphics Warranty Brochure](#) at 3Mgraphics.com.

#### (1) Reduced Warranted Durability Based on Exposure

For graphics oriented in a non-vertical, outdoor exposure, multiply the warranted durability years for your graphic construction as shown in the applicable Warranted Durability Tables, Section C.(1) or Section DNO TAG, by the percentage shown for the intended graphic exposure.

<b>If the Graphic Exposure is:</b>	<b>Use this Percentage of U.S. Vertical Exposure, Warranted Durability</b>	<b>Calculation Examples</b>
Desert Southwest Vertical	70% (0.7)	0.7 x 5 years = 3.5 years
Non Vertical or Horizontal	0	0

#### (2) Abrasion and Loss of Gloss

Abrasion damage and loss of gloss are not covered by any 3M warranty. This is considered normal wear and tear.

- (3) **Application Outside the U.S.** Contact the 3M organization for that country.
- (4) **Application to Glass** 3M accepts no liability for glass breakage when using this film for window graphics. See [Instruction Bulletin 5.1](#) for details.
- (5) **Graphics Made with Components Not Sold or Recommended by 3M** The 3M™ MCS™ Warranty does not, under any circumstances, cover graphics made with inks, film, graphic protection and/or application tapes that are not sold or recommended by 3M.

The 3M Performance Guarantee does not, under any circumstances, cover the following: OEM inks, even those approved by 3M for this program, or any type of 3M product failure that results from their use; any film, graphic protection and/or application tapes that are used with the graphic that are not sold or recommended by 3M.

The user is solely responsible for the graphic appearance, performance and durability of graphic constructions that include any non recommended or qualified products.

## 8. Factors that Affect Graphic Performance Life

The actual performance life of a graphic is affected by all of the following.

- The combination of graphics materials used
- Ink formulation
- Adequate ink drying or curing
- Selection, condition and preparation of the substrate
- Surface texture
- Application methods
- Angle and direction of sun exposure
- Environmental conditions
- Cleaning or maintenance methods

## 9. Graphics Manufacturing

### CAUTION




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

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### A. Printer Support Information

- (1) **Ink** Always read and follow the ink manufacturer's written instructions on usage.
- (2) **Total Ink Coverage** The maximum recommended total ink coverage for this film is: **270%** when printed with all approved 3M solvent inkjet inks.  
Do not exceed the recommended total ink coverage for the ink series used on this film. Too high a total physical ink amount on the film results in media characteristic changes, incomplete drying, overlamine lifting, and/or poor graphic performance. Refer to the Product & Instruction Bulletin for the ink system being used for additional details about total ink coverage.
- (3) **Completely Dry Graphics**

#### Important Note!

Incomplete drying can result in graphic failure including curling, increased shrinkage and adhesion failure, which are not covered under warranty.

Always build enough time into your process to ensure complete drying of the graphic. Poorly dried film may become soft and stretchy, and the adhesive may become too aggressive. This can cause difficulty when applying an overlamine, rolling or applying the graphic. See the ink's Instruction Bulletin for more details.

#### (4) About Printing on Perforated Film

Due to the perforations in this film, it is harder to match the image quality of a solid film.

Higher total ink coverage increases drying issues; the film may lift from the liner, stick to the liner when rolled up, and/or wrinkle when being overlaminated.

### B. Graphic Protection

An overlaminate is required. Use overlaminate 8914 when optical clarity is required. Overlaminate 8518 can be used for other applications requiring only a gloss finish.

Before applying graphic protection, read the section *Edge Sealing*, page 6.

### C. Cutting

Common cutting methods are:

- Cold steel rule die
- Razor blade
- Sharp knife

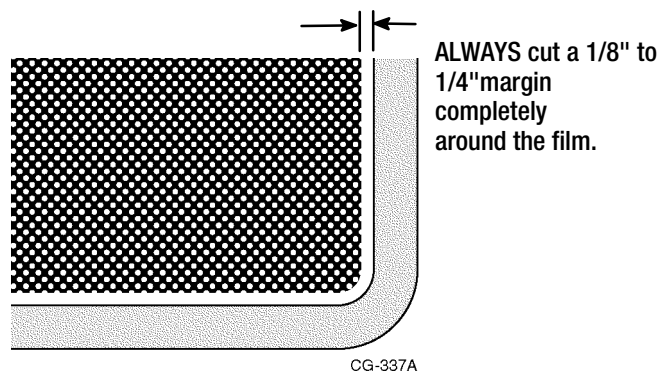
### D. Application Tapes

Do not use an application tape when the graphic includes an overlaminate.

### E. Installation

1. If the perforated film is applied to narrow (2 inches/50 mm wide) painted metal surfaces between windows, the image may not look consistent. To maintain a consistent image, an opaque 3M vinyl film may be applied to the surfaces between windows before the perforated film is applied. The color of vinyl film used depends on the image you want.
2. Make sure you cut away a margin of 1/8 to 1/4 inch (3 to 6 mm) all around the graphic. See FIGURE 1. This eliminates the need for edge sealing on full window coverage.
3. Do NOT apply the any film to any rubber gaskets or parts on the buses.
4. Do NOT allow any film to overlap the openings for any emergency window exits.
5. For complete application details, please refer to the most current release of the following 3M Instruction Bulletins. Refer to [www.3Mgraphics.com](http://www.3Mgraphics.com) to obtain these.
  - Always use a dry application method. Refer to [Instruction Bulletin 5.5](#), *General Procedures for Interior and Exterior Dry Applications*.
  - [Instruction Bulletin 5.4](#), *Application: Special Applications and Vehicles*, specifically the "Vehicle and Store Windows" section.

FIGURE 1  
Leave a Space All Around the Window



### F. Edge Sealing

Edge sealing improves the resistance to environmental damage and enhances the durability of the graphics. We recommend using one of these easy options on graphic edges.

Overlaminate 8914 is available from 3M as an edge sealing tape in 1/2 inch (13 mm) rolls. It can be used with overlaminate 8914 or 8518.

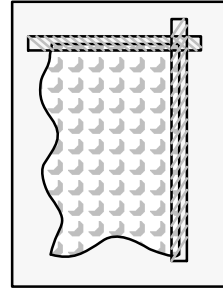
- (1) OPTION 1:  
Seal the edges with strips of overlaminate

*This method can be used whether your graphic has an overlaminate or a screen printed clear applied.*

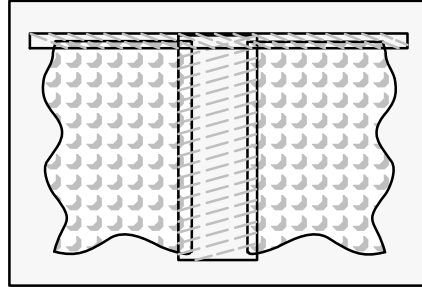
Apply a 1/2 inch (13 mm) strip of edge tape 8914 so each strip evenly straddles the perforated film and substrate. Overlap the corners. See FIGURES 2 to 4.

**FIGURE 2**  
Overlap Edges of Film

Using 1/2 inch (13 mm) wide strips of 8914, overlap glass by about 1/4 inch (7 mm). Also overlap corners.

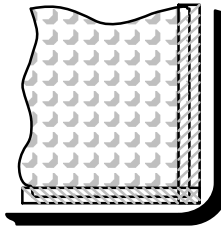


**FIGURE 3**  
Gaps Between Windows



Where there is a small gap between windows, overlap entire gap with strips of overlamine so it extends about 1/4 inch (7 mm) onto perforated film.

**FIGURE 4**  
Rubber Molding



Where there is a rubber molding around windows, apply as in Figure 1, but do not apply over any rubber molding.

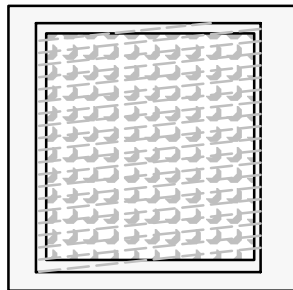
- (2) OPTION 2:  
Apply an oversized piece of overlamine

*This method is for use by experienced applicators and should be used only on graphics that cover just part of a window or have irregular shapes.*

Cut the overlamine so it is at least 1/4 inch (7 mm) larger than the graphic and apply so it overlaps all edges of the perforated film. Contact us for more details, if needed. See FIGURE 5.

Note: Never allow film or overlamine to touch the rubber window molding.

**FIGURE 5**  
Rubber Molding



Overlap entire graphic with a single sheet of overlamine so it extends at least 1/4 inch (7 mm) beyond the edges of the graphic.

## 10. Cleaning Graphics

Use a cleaner designed for high-quality painted surfaces. The cleaner must be wet, non-abrasive, without strong solvents, and have a pH value between 3 and 11 (neither strongly acidic nor strongly alkaline.)

Refer to [Instruction Bulletin 6.5](#) for general maintenance and cleaning information.

## 11. Removal

See the removal temperatures on page 3.

Refer to Instruction Bulletin 6.5 for more removal details.



Heat may be used to assist in removing the film. However, use caution to avoid breaking the glass. 3M does not warrant glass breakage.

## 12. Shelf Life, Storage and Shipping

### A. Shelf Life

**Total shelf life: 3 years** from the date of manufacture on the original box. Up to 3 years unprocessed, **OR** process within 2 years **and** then apply within 1 year of processing.

### B. Storage Conditions

- 40° to 100°F (4° to 38°C)
- Out of sunlight
- Clean dry area
- Original container
- Bring the film to print room temperature before using

### C. Shipping Finished Graphics

Flat, or rolled printed side out on 5 inch (13 cm) or larger core. This helps prevent the liner and, if used, the application tape from popping off.

## 13. 3M Related Literature

Before starting any job, be sure you have the most current Product and Instruction Bulletins.

The information in 3M Product and Instruction Bulletins is subject to change. Current Bulletins are available at [3Mgraphics.com](http://3Mgraphics.com). The following applicable Bulletins provide information and processes you need to properly make the graphics described in this Bulletin. Additional Bulletins may be needed as indicated in the 3M Related Literature section of other 3M components you use.

Bulletin types: PB = Product Bulletin; PB-IB = Product & Instruction Bulletin; IB = Instruction Bulletin

Subject	Type	Bulletin No.
3M™ Piezo Inkjet Ink Series 1500v2	PB-IB	1500
3M™ Piezo Inkjet Ink Series 4400	PB-IB	4400
3M Graphic Protection Products	PB	GP-1
Cold roll lamination	IB	4.22
Using 3M application tapes; premasking and prespacing for films	IB	4.3
Scoring and cutting	IB	4.1
Application, substrate selection, preparation and substrate-specific application techniques	IB	5.1
Application, special applications and vehicles	IB	5.4
Application, general procedures for indoor and outdoor dry applications	IB	5.5
Application: Special considerations for autos, van, buses, inspection forms	IB	5.36
Storage, handling, maintenance, removal	IB	6.5

[3M Commercial Graphics Warranty Brochure](#)

go to [www.3Mgraphics.com](http://www.3Mgraphics.com), Warranties

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## 14. Bulletin Change Summary

Overlaminated 8518 was added as an approved product. This affected text in several paragraphs, which are marked with a black bar in the margin.



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