



# Scotchlite™ Reflective Graphic Film

## IJ680-10 and RG680-10

### For Piezo Ink Jet Printing Only

#### Description

Films IJ680-10 and RG680R-10 are flexible, enclosed lens, 7-mil retroreflective films. These films feature 3M's slideable and repositionable, pressure-activated adhesive to aid in large graphic application. These medium to long term durable films are designed for commercial vehicle, railroad graphics, corrugated surfaces and striping, and are piezo ink jet printable.

#### Advantages

- Similar daytime and nighttime appearance
- Excellent angularity
- Retains 90% of its retroreflectivity when totally wet
- Unprocessed film resists fuel vapors or occasional spills

#### Recommended Types of Graphics and End Uses

These end uses are recommended for this film and may be covered by the 3M™ MCS™ Warranty and/or the 3M Performance Guarantee. Certain restrictions may apply; please read the entire bulletin for details.

- Vertical commercial vehicle graphics, railroad graphics, commercial signs and striping
- Vertical indoor and outdoor signage

#### Limitations of End Uses

We do not normally warrant other end uses, but please contact us to discuss your needs or let us suggest other 3M products.

#### Unsuitable End Uses for This Film

- Application to FRP without a Tedlar® coating
- Permanent, regulatory traffic signs
- Stainless steel; contact Technical Service

- Graphics made for automotive Original Equipment Manufacturers (OEM); contact 3M Automotive Division at 1-800-328-1684 for alternatives.
- Graphic removal from:
  - Railroad applications
  - Stainless steel substrates
  - Bare aluminum substrates
  - Skip or tight corrugations
  - Rivet heads
  - Applications with poor paint-to-substrate adhesion.
  - Existing graphics that must remain intact. Damage may occur during removal of this film.

#### Compatible Products

Refer to the durability tables for 3M MCS warranty and the 3M Performance Guarantee (page 3) for the proper combination of printers, inks, films and graphic protection.

#### Inks and Printers for Film IJ680-10

Forward wound on a 3-inch unnotched core.

- 3M™ Piezo Ink Jet Ink Series 2200UV
  - VUTEk PressVu® UV 200/600 printer
- 3M™ Piezo Ink Jet Ink Series 2600UV
  - 3M™ Printer 2500UV
- 3M™ Piezo Ink Jet Ink Series 2700UV
  - Durst Rho 160R Printer
- 3M™ Piezo Ink Jet Ink Series 1500
  - VUTEk UltraVu™ 150 Printer
  - VUTEk UltraVu™ 2360/3360 Printers
  - VUTEk UltraVu™ 3300/5300 Printers
  - VUTEk UltraVu™ 3000/5000 Printers
- 3M™ Piezo Ink Jet Ink Series 6000
  - Océ Arizona 30s Printer
- 3M™ Piezo Ink Jet Ink Series 4600
  - HP Scitex Pressjet-W™ Printer\*
- 3M™ Piezo Ink Jet Ink Series 4800
  - HP Scitex TJ8300 Series Digital Press\*

\*Order films for the Scitex printers on a forward wound 6-inch unnotched core.

## Inks and Printers for Film RG680-10

Reverse wound on an 3-inch, 4-notch core.

- 3M™ Piezo Ink Jet Ink Series 6800\*
  - Océ Arizona 180 Printer
  - Océ Arizona 90 Printer

\*May use Océ Piezo Ink Jet Ink Series 1700 for non-warranted graphics.

### Graphic Protection Options

- 3M™ Scotchcal™ Gloss Overlamine 8518  
*only for Performance Guarantee constructions*
- 3M™ Scotchcal™ Luster Overlamine 8519
- 3M™ Scotchlite™ Screen Printing Gloss Clear 2920DR
- 3M™ Screen Printing Gloss Clear 9720UV

### Other Products

- 3M™ Edge Sealer 4433
- 3M™ Prespacing Tape SCPS-2
- 3M™ Prespacing Tape SCPS-53X
- 3M™ Premasking Tape SCPM-3
- 3M™ Premasking Tape SCPM-44X

## Characteristics

All values given are typical for unprocessed film unless noted otherwise and are not for use in specifications. Processing film may change certain values. If you have questions about your construction, contact the Technical Service helpline at 1-800-328-3908.

### Physical Characteristics

Characteristic	Description
Material	Vinyl
Film color	White
Thickness	<b>With adhesive:</b> 7-8 mils (0.18 – 0.20 mm)
Adhesive type	Pressure-activated, positionable
Adhesive color	Clear with silver underneath
Liner	Polyethylene-coated liner
Retroreflectivity <i>typical</i>	100 candlepower at -4° entrance angle and 0.2° observation angle. <i>See further explanation below tables.</i>
Chemical resistance	Resists mild alkalis, mild acids, and salt  Excellent resistance to water <i>(this does not include immersion)</i>  Resists occasional fuel spills
Flammability	Call 1-800-328-3908 for information

## Application Characteristics

Characteristic	Description
Finished graphic application recommendation	<b>Surface type:</b> Flat, with and without rivets; moderate curves; corrugations  <b>Substrate type:</b> Aluminum, FRP, paint  <b>Application temperature:</b> 40° to 100°F (4° to 38°C) flat surfaces without rivets  45° to 100°F (7° to 38°C) flat, curved or corrugated surfaces with rivets  <b>Application method:</b> Dry
In use temperature range	-30° to +200°F (-34° to +93°C)
Graphic removal	Permanent

### Retroreflection Definition

The typical coefficient of retroreflection defined in Physical Characteristics is measured at a -4° entrance angle and a 0.2° observation angle. It is expressed in candlepower per foot-candle per square foot (candela/lux/square meter) per ASTM E 810.

The entrance angle is formed by a light beam striking the surface at a point and at a line that is perpendicular to the surface at the same point.

An observation angle is formed by the light beam striking the reflective surface and returning to the observer. From 800 feet (249 meters), a motorist normally views a graphic at a 0.2° angle.

# Warranty Information

See the 3M Graphics Center Warranty Brochure for the complete warranty and remedy details. The warranty given in the Product Bulletin that is current at the time you purchased the film is the one that 3M will honor.

3M MCS Warranty Finished Graphic Constructions and Durability				
Ink Series	1500	4600	4800	6000

## 3M™ MCS™ Warranty for Finished Graphics

3M MCS Warranty Finished Graphic Constructions and Durability												
U.S. Vertical Exposure ONLY (in years)												
Graphic Type	Vehicle			Outdoor			Indoor			Indoor		
	Vehicle	Outdoor	Indoor	Vehicle	Outdoor	Indoor	Vehicle	Outdoor	Indoor	Vehicle	Outdoor	Indoor

Film IJ680CR-10												
Graphic Protection	Ink Series											
	1500			4600			4800			6000		
8519	5	4	8	5	4	8	5	4	8	5	4	8
2920DR	5	4	8	5	4	8	3	3	8	5	4	8
9720UV	5	4	8	5	4	8	3	3	8	5	4	8
none	-	3	3	-	3	3	-	2	3	-	3	3

Ink Series	2200UV			2600UV			2700UV		
	8519	5	4	8	5	4	8	5	4
2920DR	-	-	-	5	4	8	-	-	-
9720UV	5	4	8	5	4	8	5	4	8
none	-	3	3	-	3	3	-	3	3

Ink Series	6800		
	Film RG680 CR-10		
8519	5	4	8
2920DR	5	4	8
9720UV	5	4	8
none	-	3	3

## How to Determine Other MCS Warranty Durabilities

Use the warranted durability for your construction if exposed in a U.S. vertical orientation and use the following formulas to determine other durabilities.

Formulas for Other 3M MCS Warranty Finished Graphic Durabilities	
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U.S. Vertical Desert Southwest Exposure	
Percentage of U.S. Vertical Exposure	70% (0.7)
Example	0.7 x 5 years= 3.5 years

## 3M Performance Guarantee

for Product Performance Only

Graphics constructed as described in the table below are eligible for the 3M Performance Guarantee warranty. This is not a finished graphics warranty; it covers product performance *only* for the 3M specified products when imaged with the printers and OEM inks listed in the most current version of **Product Bulletin PG Matrix**. That bulletin may also list certain restrictions for using this film.

3M Performance Guarantee Graphic Constructions and Durability				
U.S. Vertical Exposure (in years)				
Film	Graphic Protection	Vehicle Outdoor	Indoor	Inks and Printers

IJ680-10	8518 8519 8520 1920DR 9720UV	2	4	See Product Bulletin PG Matrix
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## Warranty Notes

### Terms



face of graphic

### Vertical Exposure

The face of the graphic is  $\pm 10^\circ$  from vertical.

**Vehicles.** Refers to commercial fleet, buses, vans and automobiles unless otherwise noted.

**Outdoor and Indoor.** Indicates warranties for signs.

## Graphic Performance Life

The actual performance depends on the:

- Use of 3M compatible products and recommended printers
- Correct combination of film, ink and graphic protection (if required)
- Adequate ink drying
- Selection and preparation of the substrate
- Surface texture
- Application methods
- Angle and direction of sun exposure
- Environmental conditions
- Cleaning or maintenance methods

## Application Outside the U.S.

Contact the 3M organization for that country.

## Graphics Made with Components Not Sold or Recommended by 3M

The 3M MCS warranty does not cover finished graphics made with other manufacturers' inks, film, graphic protection and/or application tapes. The user is solely responsible for the graphic appearance, performance and durability of graphic constructions that include non-3M graphic products.

The 3M Performance Guarantee covers selected 3M graphic products when used with qualified printers and OEM inks. See page 3.

## Graphic Protection

All fleet graphics and any other graphics subjected to abrasion or mild chemicals must be protected with a clear coat or an overlamine.

- Clears 2920DR and 9720UV should be applied by screen printing.
- Overlaminates must be applied with a cold roll laminator.

## Tenting Around Rivets

This film may tent around rivets, which is not covered by any warranty.

## Application to Glass

3M accepts no liability for glass breakage when using this film for window graphics. See Instruction Bulletin 5.1 for details.

## Warranty and Limited Liability

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: 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. 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 Graphics Market Center Warranty Brochure, which gives the terms, additional limitations of the warranty, if any, and limitations of liability.

## Printer Support Information

### Ink

Always read and follow the ink manufacturer's written instructions on usage.

### Total Ink Coverage for 3M MCS Warranty Constructions

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, inadequate drying, overlamine lifting, and/or poor graphic performance. Refer to the Instruction Bulletin for the ink system being used for additional details about total ink coverage.

Ink Series	Maximum Total Ink Coverage	Ink Series	Maximum Total Ink Coverage
1500	270%	6800	300%
4600	350%	2200UV	300%
4800	270%	2600UV	300%
6000	380%	2700UV	300%

### Total Ink Coverage for 3M Performance Guarantee Constructions

We recommend a maximum total ink coverage of 270%. Make sure that the ink lay down is within the limits of what the drier can handle to prevent ink smearing.

## Drying

### **Caution**

Inadequate 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 adequate 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 the graphic, and applying the film. See the ink's Instruction Bulletin for more details.

## Cutting

### **Caution**

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

## Application Tapes

The type of application tape to use depends on the type of graphic produced and the ink and graphic protection used. Refer to Instruction Bulletin 4.3 for more details.

- Use a prespacing tape if the graphic has large amounts of exposed liner.
- Use a premasking tape if very little of the liner is exposed.

## Recommended Cutting Methods

- Hand cut
- Hot kiss cutting
- Guillotine
- Cold and hot steel-ruled die cutting
- Drum-type electronic cutting
- Flat-bed electronic cutting

## Weeding Considerations

- Electronically-cut graphics may be difficult to cut and weed. The customer must assume responsibility for testing and approving this cutting method.
- Weed the film within 24 hours of cutting it. The adhesive may flow after cutting.
- Perform weeding carefully. Cut graphics do not re-adhere well to the liner.
- Refer to Instruction Bulletin 4.1 for more details.

## Design Factors

- Use a minimum letter height of 1 inches (2.5 cm).
- Use a minimum stroke width of 3/8 inch (1.0 cm).
- Use a minimum radius for a point of 1/16 inch (1.6 mm).
- Order "roll applicator splices" for roll striping. Butt splices may have a small gap.

Premasking IS NOT recommended for:

- Continuous rolls or striping wider than 12 inches (31 cm)
- Rolls wider than 12 inches (31 cm) that will be slit

Premasking IS recommended for:

- Graphics larger than 4 square feet (0.4 m<sup>2</sup>)
- Striping greater than 4 inches (10 cm) wide

Film	Graphic Protection					
	Refer to the Warranty tables on page 3 to determine whether the Graphic Protection option listed is approved for the ink series you are using with these films.					
IJ680 with Solvent Ink	None with solvent inks	None with UV inks	8519	2920DR	9720UV	8518 & Options Listed in Product Bulletin: PG Matrix
Prespacing Tape <b>SCPS-55</b>						■
Premasking Tape <b>SCPM-3</b>	■		■	■		■
Prespacing Tape <b>SCPS-2</b>	■		■	■		
Premasking Tape <b>SCPM-44X</b>		■			■	
Prespacing Tape <b>SCPS-53X</b>		■			■	

## Handling Prespaced Graphics

For the best results when using prespacing tape, we recommend these practices.

- Store and ship prespaced film lying flat (do not roll it). This allows adhesion to build and minimizes the chance of the prespace tape from popping off of the liner or film.
- Handle the prespaced graphic as little as possible and keep it flat during processing.
- Remove as much liner as possible.

## Application

Refer to the **3M Related Literature** section, located at the end of this bulletin, for a list of the Instruction Bulletins that may be needed to apply or install this film.

### Adhesive

This film has a pressure-activated adhesive which allows the film to be positioned, slid into place and repositioned easily when only light finger pressure is used. Applying firm pressure, such as with a squeegee, bonds the adhesive to the substrate, and by design, destroys the positionability feature.

The adhesive characteristics may be reduced under these conditions:

- The film has been removed, even partially, from the original liner and reapplied to the same liner or another liner.
- When applied at higher than 100°F (38°C), the film loses its positionability feature even if only light hand pressure is applied.

### Application Method

Use a dry application method. Do not use a detergent and water or a commercial application liquid to position the graphic.

### Substrate

- Some substrates such as under-cured polyurethane paint, fiberglass and some paint systems may continue to outgas for some time. Two-part polyurethane paints and screen print clears may stop curing when the air and surface temperatures are lower than 75°F (24°C).
- This film can be applied over other recommended 3M graphic systems. Graphics printed with ink series 2920DR must be weathered for at least one year before applying this film over it. See Instruction Bulletin 5.1 for details.

### Finishing Overview

- If needed, use edge sealer 4433.
- Most graphics made with these films do not require an edge sealer, although certain applications may benefit from its use.
- All processed and unprocessed graphics subjected to fuel vapors or occasional fuel spills do require edge sealer.
- Edge sealing in the following applications is not required, but it may help keep the edges adhered when subjected to external sources such as abrasion and/or high pressure washing.
  - graphics exposed to severe abrasion or high pressure washing (see Note, below)

- graphics applied to chrome substrates
- graphics applied to locomotives and rolling railroad stock
- graphics applied to truck rollup doors

Note: Refer to Instruction Bulletin 6.5 for details on pressure cleaning. Exceeding 3M's recommendations will void the warranty whether or not an edge sealer was properly used.

## Maintenance and Cleaning

Use a cleaner such as the kind used 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.)

## Removal

### Caution

Solvents may ignite near heat or open flame. Do not use heat sources near solvents. Failure to avoid the use of heat sources near solvents can cause flash fire.

Film IJ680-10 is not a removable product. Heat helps take off the top layer, but removing the adhesive requires a solvent-based remover.

Refer to Instruction Bulletin 6.5 for more details.

## Shelf Life, Storage and Shipping

Activity	Recommendation
Shelf life	<b>Total shelf life: 2 years</b> Up to 2 years unprocessed, <b>OR</b> process within 1 year <b>and</b> apply within 1 year of processing
Storage conditions	<ul style="list-style-type: none"><li>• 100°F (38°C) maximum</li><li>• Out of sunlight</li><li>• Clean dry area</li><li>• Original container or suspend rolls horizontally</li><li>• Cut sheets must lie flat</li><li>• Bring the film to print room temperature before using</li></ul>
Shipping finished graphics	Flat, or rolled printed side out on 6 inch (15 cm) or larger core. This helps prevent the application tape, if used, from popping off.

See Instruction Bulletin 6.5 for details.

## 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 [www.3m.com/msds](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.

### Attention: Authorized Graphics Manufacturers

Visit our password-protected website for exclusive product information, profiles and services. Certain restrictions apply.

1. Go to [www.scotchprint.com](http://www.scotchprint.com).
2. Select a country.
3. Click *Login* on upper left side of screen.
4. Click Register.
5. Enter authorization code: **CGD\_SGN**.
6. Complete the information and submit.  
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 Product and Instruction 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 appropriate Bulletin(s) that was current at the time you purchased the 3M products. The following Product and/or Instruction 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™ Piezo Ink Jet Ink Series 2200UV	2200UV	4597
3M™ Piezo Ink Jet Ink Series 2600UV	2600UV	4594
3M™ Piezo Ink Jet Ink Series 2700UV	2700UV	4598
3M™ Piezo Ink Jet Ink Series 1500	1500	4578
3M™ Piezo Ink Jet Ink Series 4600	4600	4582
3M™ Piezo Ink Jet Ink Series 4800	4800	4602
3M™ Piezo Ink Jet Ink Series 6000	6000	4560
3M™ Piezo Ink Jet Ink Series 6800	6800	4574
3M™ Scotchlite™ Screen Printing Ink Series 2900	2900	2512
3M™ Screen Printing Ink Series 9700UV	9700	2507
3M™ Scotchcal™ Overlaminates 8518	8518	4600
3M™ Scotchcal™ Overlaminates 8519 and 8520	8519/ 8520	4524
3M Performance Guarantee Printer Matrix	PG Matrix	4599
<b>Instruction Bulletins</b>		
Design of graphics	2.1	5501
Printing with piezo ink series 2200UV	4.52	6552
Printing with piezo ink series 2600UV	4.50	6550
Printing with piezo ink series 2700UV	4.53	6553
Printing with piezo ink series 1500	4.45	6545
Printing with piezo ink series 4600	4.43	6543
Printing with piezo ink series 4800	4.51	6551
Printing with piezo ink series 6000	4.39	6539
Printing with piezo ink series 6800	4.40	6540
Screen printing with line series 2900	3.18	6018
Screen printing with ink series 9700UV	3.4	6004
Cold roll lamination	4.22	6522
Scoring and cutting	4.1	6501
Using 3M application tapes; premasking and prespacing for films	4.3	6503
Application, substrate selection, preparation and substrate-specific application techniques	5.1	7001
Application, special applications and vehicles	5.4	7004
Application, general procedures for interior and exterior dry applications	5.5	7005
Storage, handling, maintenance, removal	6.5	8505
<b>Warranties</b>		
3M Graphics Market Center Warranty Brochure		9503

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Pressjet-W is a trademark of Scitex Corporation Ltd.  
Tedlar is a registered trademark of Dupont.  
All other trademarks are the property of their respective owners.

## Bulletin Change Summary

Changes to the 3M Performance Guarantee program Over-laminate 8518 has been added as a compatible product. Because we are continually testing and approving more platforms, the specific 3M-qualified printers and OEM inks are now listed only in the Product Bulletin PG Matrix. To obtain this bulletin from the web, go to [www.scotchprint.com](http://www.scotchprint.com), select Technical Bulletins, select Product Bulletins, select Piezo Ink Jet Films, select Films for other printers. The bulletin PG Matrix appears at the top of the page.

Other New Products. Added ink series 4800, 2200UV and 2700UV.

Warranty information. The bulletin has been updated to better show the differences between the 3M MCS Warranty and 3M Performance Guarantee durabilities.

Other changes. Specific maximum total ink coverage values, by ink series, have been added (page 5). All additions or changes to text are marked with a black bar in the margin.



Regional Phone Numbers:  
North East: 1-800-257-8226  
South East: 1-800-537-4606  
Great Lakes: 1-800-733-9942

Midwest: 1-800-736-7636  
West: 1-800-252-7767  
Mexico: 011-525-55-576-6667  
[www.sourceoneonline.com](http://www.sourceoneonline.com)