



# Scotchlite™

## Reflective Graphic Film 5100R/IJ5100R, RG5100R and FN5100R

**For Screen Printing, Piezo Ink Jet Printing and Electrostatic Imaging**

### Description

3M™ Scotchlite™ Reflective Graphic Film 5100R/IJ5100R, is a removable, retroreflective 6-mil film designed for screen printing, piezo ink jet printing or electrostatic imaging. The superior angularity makes the film well suited for medium-term emblems, commercial vehicle markings, bus graphics, stickers and non-regulated industrial signage. This film is also available as film RG5100R and FN5100R.

### Recommended Types of Graphics and End Uses

These types of graphics and end uses may be warranted by the 3M™ MCS™ Warranty. Please read the entire bulletin for details. A Performance Guarantee is also offered for film IJ5100R; see page 4 for details.

- Outdoor graphics such as:
  - Commercial vehicle or fleet graphics
  - Bus graphics
  - Non-regulated industrial signage
  - Emblems and stickers

### Limitations of End Uses

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

### Unsuitable End Uses for This Film

- Graphics applied to:
  - Corrugated or highly irregular surfaces or to sharply raised areas like huck bolts
  - Substrates with compound curves
  - Substrates that do not have a clean, smooth surface or have poor paint-to-substrate adhesion
  - Stainless steel
  - Flexible substrates
- Graphics regularly subjected to gasoline vapors or spills such as gas pumps, automobile fuel-tank ports or top-feeding petroleum tankers.
- Graphics made for automotive Original Equipment Manufacturers (OEM); contact 3M Automotive Division at 1-800-328-1684 for alternatives.

### Important Information About Bus Applications

Film used on buses must not be applied so as to restrict the safe use of emergency window exits. See the most current version of Instruction Bulletin 5.4 for details.

### Compatible Products for 3M™ MCS™ Warranted Graphics

Note: Refer to the warranted durability table to determine which options are suitable for your printing platform.

#### Screen Printing

- 3M™ Scotchlite™ Transparent Screen Printing Ink Series 2900 *line color and four color*
- 3M™ Screen Printing Ink Series 1900 *line color and four-color*
- 3M™ Screen Printing UV Ink Series 9800 *line color and four color*

#### Electrostatic Imaging Materials

- Scotchprint® Electronic Graphics System
- 3M™ Trident Transfer Paper
- Scotchprint® Toner Series 8700/8800 ES

#### Inks and Printers for Film IJ5100R

This film is forward wound on a 3-inch unnotched core.

- 3M™ Piezo Ink Jet Ink Series 1500
  - VUTEk UltraVu™ 150 Printer
  - VUTEk UltraVu™ 2360/3360 Printers
  - VUTEk UltraVu™ 3300/5300 Printers
- 3M™ Piezo Ink Jet Ink Series 2600UV
  - 3M™ Printer 2500UV
- 3M™ Piezo Ink Jet Ink Series 6000
  - Océ Arizona 30s Printer

Order film for the Scitex printer on a forward wound, 6-inch unnotched core.

- 3M™ Piezo Ink Jet Ink Series 4600
  - Scitex Pressjet-W™ Printer

## Inks and Printers for Film RG5100R

This film is reverse wound on a 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.

## Inks and Printers for Film FN5100R

This film is forward wound on a 3-inch, 4-notch core.

- 3M™ Piezo Ink Jet Ink Series 5500
  - Océ Arizona 600 Printer

## Graphic Protection Options

- 3M™ Screen Print Gloss Clear 1920DR
- 3M™ Scotchlite™ Screen Print Gloss Clear 2920DR
- 3M™ Screen Print Gloss Clear 9720UV
- 3M™ Screen Print Gloss Clear 9800CL
- 3M™ Screen Print Clear 8920 ES
- 3M™ Scotchcal™ Luster Overlamine 8519
- 3M™ Scotchcal™ High Gloss Overlamine 8912 ES  
*not for use on rivets*
- 3M™ Scotchcal™ Optically Clear High Gloss Overlamine 8914 ES

## Other Products

- 3M™ Scotchlite™ 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	5100R/IJ5100R-10 White 5100R/IJ5100R-64 Gold 5100R/IJ5100R-71 Yellow 5100R/IJ5100R-72 Red 5100R/IJ5100R-76 Blue 5100R/IJ5100R-85 Black

Characteristic	Description
Thickness	<b>With adhesive:</b> 6 mils (0.9 mm)
Adhesive type	Pressure sensitive
Adhesive color	White
Liner	Polyethylene-coated layflat liner
Retroreflectivity <i>typical</i>	At -4° entrance angle and 0.2° observation angle. See further explanation to the right. 5100R/IJ5100R-10 White 85 5100R/IJ5100R-64 Gold 55 5100R/IJ5100R-71 Yellow 50 5100R/IJ5100R-72 Red 20 5100R/IJ5100R-76 Blue 10 5100R/IJ5100R-85 Black 25
Chemical resistance	Resists mild alkalis, mild acids, and salt  Excellent resistance to water <i>(this does not include immersion)</i>
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; simple curves  <b>Substrate type:</b> Etched aluminum, FRP, painted metal  <b>Application temperature:</b> 32° to 85°F (0° to 30°C) <i>air and substrate</i>
Service temperature range	-30° to +200°F (-34° to +93°C)
Graphic removal	Removable with heat from painted flat surfaces

### Retroreflection

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 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

## Graphic Performance Life

The actual performance depends on the:

- Correct combination of 3M–recommended graphics products
- Ink formulation (screen printing)
- Adequate ink drying (piezo ink jet) and UV curing (screen printing)
- Selection and preparation of the substrate
- Surface texture
- Application methods
- Angle and direction of sun exposure
- Environmental conditions
- Cleaning or maintenance methods

## 3M™ MCS™ Warranted Graphic Constructions

The warranty given in the Product Bulletin that is current at the time you purchased the film is the one that 3M will honor.

The warranties in this table are for graphics exposed in the U.S. in a vertical orientation. See **Warranty Notes** for how to determine other warranty combinations.

Warranted Durability				
Film plus...		U.S. Vertical Exposure (in years)		
Ink Series	Graphic Protection	Fleet & Comm'l Vehicle Graphics and Indoor Graphics	Outdoor Signs	
		Permanent and Removable	Permanent Only	Removable Only
Unprinted	None	4	3	0
Screen Printing Platforms				
2900	2920DR	4	3	0
	4430	4	3	0
	9720UV	4	3	0
1900	1920DR	4	3	0
2900	2920DR	4	3	0
	4430	4	3	0
	9720UV	4	3	0
9800	9720UV	4	3	0
	9800CL	4	3	3

Warranted Durability, continued					
Film plus...		U.S. Vertical Exposure (in years)			
Ink Series	Graphic Protection	Fleet & Comm'l Vehicle Graphics and Indoor Graphics	Outdoor Signs		
		Permanent and Removable	Permanent Only	Removable Only	
Piezo Ink Jet Printing Platforms					
1500 2600UV 4600 5500 6000 6800	8519	4	3	0	
	2920DR	4	3	0	
	9720UV	4	3	0	
	Electrostatic Imaging Platform				
	8700 Toner	8519	4	3	0
8914		4	3	0	
8912 ES		4	3	0	
8920 ES		4	3	0	

## Warranty Notes

### Graphic Exposure Definitions



face of graphic

#### Vertical Exposure

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



face of graphic

#### Non-Vertical Exposure

The face of the graphic is  $10^\circ$  to  $45^\circ$  from vertical.

### How to Determine U.S. Non-Vertical and Desert Southwest Warranties

All other exterior warranties are based on a percentage of the vertical U.S. warranties given in the Warranted Durability Table(s). The calculation for determining these warranties is given below. A “construction” is the base film, ink and graphic protection (if required). The examples are based on a vertical U.S. warranty of 4 years.

- **Warranty for Non-Vertical U.S. Exposure**

50% (0.5) of the vertical warranty for your construction

Example:  $0.5 \times 4 \text{ years} = 2 \text{ years}$

- **Warranty for U.S. Desert Southwest Exposure**

For graphics exposed to solar energy more than half of the time in Arizona, New Mexico and the desert areas of California, Nevada, Utah and Texas. A detailed map is available upon request.

- **Vertical U.S. Desert Southwest**

70% (0.7) of the U.S. vertical warranty for your construction

Example: 0.7 x 4 years = 2.8 years

- **Non-vertical U.S. Desert Southwest**

35% (0.35) of the U.S. vertical warranty for your construction

Example: 0.35 x 4 years = 1.4 years

### Removal Warranty

This film is removable with heat from painted flat substrates for the period stated in the Removable Graphic Application section of the Warranted Durability Table.

### Application Outside the U.S.

Contact the 3M organization for that country.

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

The user is solely responsible for the graphic appearance, performance and durability when this film is used with any other manufacturers' inks, graphic protection and/or application tapes. See the 3M Performance Guarantee for other options.

### Special Warranty Stipulations for Automobile, Van and Bus Graphics

Automobiles, vans and buses require the completion of a Pre-Installation and Inspection Report for each vehicle that must be readily available if a claim is made. Refer to Instruction Bulletin 5.36 for the appropriate form.

### Graphic Protection

All fleet graphics, all graphics printed with four-color screen print ink, all electrostatically-imaged graphics and any other graphics subjected to abrasion or mild chemicals must be protected with a clear coat or an overlamine.

- **Screen printed vehicle graphics printed with UV ink series 9800** must have a UV clear coat in order to be warranted. Abrasion damage and gloss loss are not covered.
- **Screen print clears** must be applied by screen printing
- **Overlaminates** must be cold roll applied using 3M authorized laminators and processes.

### Rivets

This film will tent around rivets, which is not covered by the MCS 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 Remedy

*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:* 3M graphics materials 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. See the worldwide 3M™ MCS™ Warranty ([www.Scotchprint.com](http://www.Scotchprint.com) or Fax-on-Demand), which gives the terms and limitations of the warranty.

**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.**

## 3M Performance Guarantee for Film IJ5100R Only

The 3M Performance Guarantee covers only product performance of 3M films and the required 3M graphic protection product when used with the printers and OEM inks listed in this table for the types of graphics, construction methods and application techniques specified in the base film's 3M Product Bulletin and related Instruction Bulletins. This is not a finished graphics warranty. The sole remedy is the replacement cost of 3M films and graphic protection product used in the construction for the durability term. See the Performance Guarantee details at [www.Scotchprint.com](http://www.Scotchprint.com).

Performance Guarantee			
Film IJ5100R with graphic protection 8519, 9720UV, or 2920DR		U.S. Vertical Exposure	
Printer	Ink Series	Fleet Graphics Outdoor Signs	Indoor Signs
Mimaki JV 3 Series	MS, SS, S2	2 years	4 years
Mutoh Falcon II Outdoor	Eco-Solvent Plus™		
Océ CS6060	Océ IJC610		
Roland SOLJET Pro II Ex Series	Roland Eco-SOL		
Seiko ColorPainter™ 64S	EG-Outdoor		

### Total Ink Coverage for 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.

## Screen Printing

Formulations and processing conditions can affect ink durability. Refer to the Product and Instruction Bulletins for your ink for limitations and proper usage.

Ink series 1900 and some colors in ink series 9800 are opaque. Be aware that opaque ink can prevent the film from retroreflecting in the screen printed areas. Ink series 2900 and the transparent colors from ink series 9800 are good choices when retroreflection is important in the screen printed areas.

## Electrostatic Imaging

For electrostatic imaging, refer to Product Bulletin Trident and Instruction Bulletin 4.7.

Also read the printer manufacturer's printer instructions.

Apply graphic protection.

## Piezo Ink Jet Printer Support Information

### Ink

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

### Total Ink Coverage

Do not exceed the recommended total ink coverage for 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 the recommended total ink coverages.

### Color Profiles

Many color profiles are available on our website at [www.Scotchprint.com](http://www.Scotchprint.com).

### Drying

#### Caution

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.

The following are common cutting methods for this film. See Instruction Bulletin 4.1 for details.

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

### Minimum Cutting Heights

Based on cutting and weeding evaluations that used Helvetica medium upper case, the recommended minimum cutting height for text is 3 inches (0.95 cm) and 3/8 inch stroke width. Because of the differences in electronically-controlled cutting equipment and font characteristics, users should determine their own cutting and weeding capability.

## Application Tapes

The type of application tape to use depends on the type of graphic produced and the ink or graphic protection that was applied last. See Instruction Bulletin 4.3 for details.

Ink Series	Graphic Protection	Prespacing Tape	Premasking Tape
<b>Screen Printing Platforms</b>			
9800	1920DR 9720UV 9800CL	SCPS-53X	SCPM-44X
1900	1920DR	SCPS-2	SCPM-3
2900	2920DR 1920DR	SCPS-2	SCPM-3
<b>Electrostatic Imaging</b>			
8700	1920DR 8519 8914 8912 ES 8920 ES	SCPS-2 SCPS-53X	SCPM-3 SCPM-44X
<b>Piezo Ink Jet Printing Platforms</b>			
1500 2600UV 4600 5500 6000 6800	2920DR 8519 9720UV	SCPS-2, optional SCPS-53X, optional	SCPM-3 SCPM-44X

## Application and Installation

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

Apply this film using the dry application method. Moisture that has condensed on the substrate will prevent good adhesion. Install on a dry substrate.

For improved graphic appearance, we suggest cutting around rivets.

Avoid over-handling or creasing the film, which can result in a bruised appearance.

## 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

See Instruction Bulletin 6.5 for removal information.

## 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</li></ul>
Shipping finished graphics	Flat, or rolled printed side out on 5 inch (13 cm) or larger core; processed film may block if wound too tightly

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 <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 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™ Screen Printing Ink Series 1900 and Overprint Clear VI0402	1900	2501
3M™ Scotchlite™ Screen Printing Ink Series 2900	2900	2512
3M™ Screen Printing Ink Series 9700UV	9700	2507
3M™ Screen Printing UV Ink Series 9800	9800	2513
Scotchprint® Toner Series 8700/8800	8700	3514
3M™ Piezo Ink Jet Ink Series 1500	1500	4578
3M™ Piezo Ink Jet Ink Series 2600UV	2600UV	4594
3M™ Piezo Ink Jet Ink Series 4600	4600	4582
3M™ Piezo Ink Jet Ink Series 5500	5500	4592
3M™ Piezo Ink Jet Ink Series 6000	6000	4560
3M™ Piezo Ink Jet Ink Series 6800	6800	4574
3M™ Scotchcal™ Overlamine 8519 and 8520	8519/ 8520	4524
3M™ Scotchcal™ High Gloss Graffiti Resistant Overlamine 8912 ES	8912	3521
3M™ Scotchcal™ Optically Clear Overlamine 8914 ES	8914	3542

Subject	Bulletin No.	FOD No.
<b>Instruction Bulletins</b>		
Screen printing with ink series 1900 - line color - 4-color	3.12 3.11	6012 6011
Screen printing with line ink series 2900	3.18	6018
Screen printing with ink series 9700UV	3.4	6004
Screen printing with UV ink series 9800 - line color - 4-color	3.20 3.21	6020 6021
Using toner series 8700/8800	4.12	6512
Printing with piezo ink jet series 1500	4.45	6545
Printing with piezo ink jet series 2600UV	4.50	6550
Printing with piezo ink jet series 4600	4.43	6543
Printing with piezo ink jet series 5500	4.47	6547
Printing with piezo ink jet series 6000	4.39	6539
Printing with piezo ink jet series 6800	4.40	6540
Cold roll lamination	4.22	6522
Scoring and cutting	4.1	6501
Application, substrate selection, preparation and substrate-specific application techniques	5.1	7001
Storage, handling, maintenance, removal	6.5	7505
Application: Special Considerations for Complex Contours of Automobiles, Vans and Buses and Inspection Forms	5.36	7036
<b>Warranties</b>		
Worldwide 3M™ MCS™ Warranty		9503

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UltraVu is a trademark of VUTEK Inc.  
Pressjet-W is a trademark of Scitex Corporation Ltd.*

### Bulletin Change Summary

Added 5 film colors: 5100R/IJ5100R-64 Gold; 5100R/IJ5100R-71 Yellow; 5100R/IJ5100R-72 Red; 5100R/IJ5100R-76 Blue; 5100R/IJ5100R-85 Black. The same film can be used for screen printing, electrostatic imaging and piezo ink jet printing, and is available as RG5100R and FN5100R as well. Retroreflection values vary for each film color.



#### Graphics Market Center

3M Center, Building 220-12E-04  
PO Box 33220  
St. Paul, MN 55144-3220 USA  
General Info. 1-800-374-6772  
Technical Info. 1-800-328-3908  
Fax 1-651-736-4233

Fax-on-Demand 1-800-364-0768 US/Canada or 1-651-732-6506 International  
Fax-on-Demand document: 2025  
[www.3M.com/graphics](http://www.3M.com/graphics)

#### 3M Canada

P.O. Box 5757  
London, Ontario  
Canada N6A 4T1  
1-800-265-1840  
Fax 519-452-6245

#### 3M México, S.A. de C.V.

Av. Santa Fe No. 55  
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México, D.F. 01210  
52-55-52-70-04-00  
Fax 52-55-52-70-22-77

#### 3M Puerto Rico, Inc.

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