



# 3M™ Scotchlite™ Reflective Graphic Film

**Series 5100** for Screen Printing and Thermal Mass Transfer

**IJ5100-10** for Inkjet Printing

For the most current 3M Technical Information available to successfully use this product, please view this Bulletin electronically and click on the blue underlined links to view the relevant documents.

## 1. Product Description

### A. Product Features and Advantages

- 7-mil, enclosed lens, retroreflective, engineer grade films that offer flexibility and versatility
- Pressure-sensitive adhesive
- Permanent
- Available in 15 colors, including black (which reflects white)
- Similar daytime and nighttime appearance that retains most of its reflectivity when wet
- Excellent angularity
- Versions for screen printing and thermal mass transfer and inkjet printing
- Designed for excellent cutting and weeding with computer sign cutting equipment
- For vertical, flat or curved surfaces with or without rivets
- Unprocessed film resists fuel vapors or occasional spills

### B. 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](#) or the [3M Performance Guarantee](#). Please read the entire Bulletin for details.

- Most standard vehicle, straight trucks, semi-tractors, semi-trailers markings and graphics
- Cut letters and decals
- Non-regulated signage

### C. Performance Overview

3M tests the performance of both individual products and finished graphic constructions. This table shows the best performance expected from this product both without a Warranty Period and with a Warranty Period.

For detailed graphic construction and application options along with specific Warranty Periods, please see the Warranty Information, Section 5 on page 5.

<b>Expected Performance Life.</b> This is the estimated period of time the product should perform satisfactorily.	
Unprinted film with no graphic protection, applied to a flat vertical outdoor surface.	7 years Unwarranted Period
<b>3M™ MCS™ Warranty.</b> This is the maximum period of time 3M will warrant the finished graphic performance.	
Printed film with the best 3M ink and graphic protection option, applied to a flat, vertical, vehicle type surface.	4 years Warranty Period
<b>3M Performance Guarantee.</b> This is the maximum period of time 3M will warrant the performance of the 3M materials used.	
Printed film with the best ink and graphic protection option, applied to a flat, vertical, vehicle type surface.	2 years Warranty Period

## D. Limitations of End Uses

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

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

- Do not apply this film on:
  - walls.
  - corrugated or highly irregular surfaces.
  - substrates with compound curves.
  - substrates without a clean, smooth surface or poor paint-to-substrate adhesion.
  - stainless steel.
  - unpainted metal other than aluminum: contact 3M Technical Service for details.
  - paint that is not fully cured.
  - a polyvinyl fluoride coating such as DuPont's Tedlar® coating.
  - flexible substrates.
- Do not apply this film to low surface energy substrates (some plastics, powder-coated paints, etc.).

## 2. Compatible Products

The following products are approved by 3M for use with the base film covered in this Bulletin and used for the creation of a graphic that may be eligible for the 3M™ MCS™ Warranty or 3M Performance Guarantee. Click on the blue underlined text, later in this Bulletin for more information about the compatible products.

See the **Warranty Information** section to determine which compatible products are approved for your graphic construction.

### A. Inkjet Inks and Printers for 3M™ MCS™ Warranty

#### (1) Solvent Inkjet Inks

#### Ink Series

- [3M™ Piezo Inkjet Ink Series 1500v2](#)
- [3M™ Piezo Inkjet Ink Series 4400](#)
- [3M™ Piezo Inkjet Ink Series 4800](#)
- [SIIT GX 3M Ink Series](#)
- [SIIT SX 3M Ink Series](#)
- [HP 3M LX600 Specialty Latex Ink](#)
- [HP LX610 Latex Ink](#)  
*a 3M™ MCS™ Warranty Component*
- [HP 792 Latex Ink](#)  
*a 3M™ MCS™ Warranty Component*
- [HP 881 Latex Ink](#)  
*a 3M™ MCS™ Warranty Component*
- HP 831 Latex Ink  
*a 3M™ MCS™ Warranty Component*

#### Printer

- EFI™ VUTEK® 150, 2360/3360, 3300/5300 & 3000/5000 Printers
- HP XLJet 1200 and 1500 Printers
- HP Scitex TJ8300 & TJ8350 Industrial Presses
- Seiko I Infotech ColorPainter™ H Series H-74s, H2-74s, H-104s, H2-104s, W-54s & W-64s Printers
- Seiko I Infotech ColorPainter™ M-64s Printer
- HP Designjet L65500; Scitex LX600, LX800, LX820 & LX850; Latex 820 & 850 Printers
- HP Designjet L65500, Scitex LX600, LX800, LX820 & LX850; Latex 820 & 850 Printers
- HP Designjet L26100, L26500 & L28500 Latex 210, 260 & 280 Printers
- HP Latex 3000 Printer
- HP Latex 360 Printer

#### (2) Latex Inkjet Inks

**(3) UV Inkjet Inks and Printers**

- [3M™ Piezo Inkjet Ink Series 2200UV](#)
- [3M™ Piezo Inkjet Ink Series 2800UV](#)
- [EFI™ VUTEK® GS 3M™ Premium UV Inks](#)
- [EFI™ VUTEK® GSr 3M™ Premium UV Inks](#)
- [EFI™ R3225 3M™ UV Ink](#)
- [EFI™ VUTEK® GSLXr 3M Superflex UV Ink](#) (excludes White Ink)
- [Mimaki LF-200 Ink Series](#)  
*Manufactured by 3M*
- [Mimaki UV Ink LUS-200](#)  
*Manufactured by 3M*
- EFI™ VUTEK® PV200 Printer
- EFI™ VUTEK® QS2000, QS3200, QS3220 and QS220 Printers
- EFI™ VUTEK® GS2000, GS3200 & GS3250 Printers, including GS Pro Series
- EFI™ VUTEK® GS5000r & GS3250r Printers
- EFI™ R3225 UV Roll-to-Roll Printer
- EFI™ VUTEK® GS3250LXr or GS5500LXr Pro Printers
- Mimaki UJV-160, JFX-1631 & 1615R Printers
- Mimaki UJV500-160 Printer

**B. OEM Inkjet Printers and Inks for the 3M Performance Guarantee**

- For the most current information, please click here: [3M Performance Guarantee Matrix](#).

**C. Screen Printing**

- [3M™ Screen Printing Ink Series 1900 \(Solvent\)](#)
- [3M™ Scotchlite™ Screen Printing Ink Series 2900 \(Solvent\)](#)
- [3M™ Screen Printing UV Ink Series 9800](#)

**D. Graphic Protection**

- [3M™ Screen Print Gloss Clear 1920DR](#)
- [3M™ Screen Print UV Gloss Clear 9740i](#)
- [3M™ Scotchcal™ Gloss Overlamine 8518](#)
- [3M™ Scotchcal™ Luster Overlamine 8519](#)
- [3M™ Screen Printing Gloss Clear 9800CL](#)
- [3M™ Scotchcal™ Optically Clear Overlamine 8914](#)

**E. Other Products**

- [3M™ Prespacing Tape SCPS-2](#)
- [3M™ Prespacing Tape SCPM-53X](#)
- [3M™ Premasking Tape SCPM-3](#)
- [3M™ Premasking Tape SCPM-44X](#)
- [3M™ Edge Sealer 3950](#)

**3. 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
Material	Vinyl
Retroreflection definition	The typical coefficient of retroreflection defined 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 E810.  The entrance angle is formed by a light beam striking the surface at a point and 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.
Thickness	<b>With adhesive:</b> 7 to 8 mils (0.18 to 0.20 mm)
Adhesive color	Clear with silver underneath
Liner	Polyethylene-coated paper
Adhesion 24 hours after application	<b>Aluminum:</b> 6.0 pounds/inch (1.1 kg/cm) <b>FRP (Fiberglass Reinforced Plywood):</b> 3.0 lb/inch (0.5 kg/cm) <b>Painted aluminum panels:</b> 4.5 pounds/inch (0.8 kg/cm)
Safety Standards	See Section 12 for ASTM, NFPA® and AAR information.

**Physical Characteristics continued....**

Characteristic	Value																																																			
Chemical Resistance	<ul style="list-style-type: none"> <li>Resists mild alkalis, mild acids, and salt</li> <li>Excellent resistance to rain (<i>not immersion</i>)</li> <li>Resists occasional fuel spills</li> </ul>																																																			
Film colors & typical retroreflection	At -4° entrance angle and 0.2° observation angle. <table border="1"> <thead> <tr> <th>Film Number</th> <th>Color Name</th> <th>Typical Coefficient of Retroreflection</th> </tr> </thead> <tbody> <tr><td>IJ5100-10</td><td>White</td><td>100</td></tr> <tr><td>5100-10</td><td>White</td><td>100</td></tr> <tr><td>5100-14</td><td>Orange</td><td>20</td></tr> <tr><td>5100-64</td><td>Gold</td><td>70</td></tr> <tr><td>5100-65</td><td>Rich Gold</td><td>65</td></tr> <tr><td>5100-71</td><td>Yellow</td><td>65</td></tr> <tr><td>5100-72</td><td>Red</td><td>20</td></tr> <tr><td>5100-74</td><td>Royal Purple</td><td>5</td></tr> <tr><td>5100-75</td><td>Blue</td><td>10</td></tr> <tr><td>5100-76</td><td>Light Blue</td><td>10</td></tr> <tr><td>5100-77</td><td>Green</td><td>20</td></tr> <tr><td>5100-78</td><td>Light Green</td><td>20</td></tr> <tr><td>5100-79</td><td>Brown</td><td>5</td></tr> <tr><td>5100-81</td><td>Lemon Yellow</td><td>75</td></tr> <tr><td>5100-82</td><td>Ruby Red</td><td>15</td></tr> <tr><td>5100-85</td><td>Black</td><td>30</td></tr> </tbody> </table>	Film Number	Color Name	Typical Coefficient of Retroreflection	IJ5100-10	White	100	5100-10	White	100	5100-14	Orange	20	5100-64	Gold	70	5100-65	Rich Gold	65	5100-71	Yellow	65	5100-72	Red	20	5100-74	Royal Purple	5	5100-75	Blue	10	5100-76	Light Blue	10	5100-77	Green	20	5100-78	Light Green	20	5100-79	Brown	5	5100-81	Lemon Yellow	75	5100-82	Ruby Red	15	5100-85	Black	30
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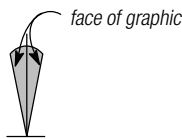
**B. Application Characteristics**

Characteristic	Value
Finished graphic application recommendation	<b>Surface type:</b> Flat, with or without rivets, moderate curves <b>Substrate type:</b> Aluminum, FRP, paint <b>Graphic orientation:</b> Vertical only <b>Application method:</b> Dry <ul style="list-style-type: none"> <li>55° – 100°F (13° – 38°C) flat, curved or corrugated surfaces with rivets</li> </ul> <b>Application temperature:</b> <i>air and substrate</i> <ul style="list-style-type: none"> <li>50° – 85°F (10° – 29°C) for flat surfaces without rivets</li> <li>55° – 85°F (13° – 29°C) for flat surfaces with rivets</li> </ul>
Temperature range after application	-30° – +200°F (-34° – +93°C)

**4. Definitions**

**A. Exposure**

**U.S. Vertical Exposure**

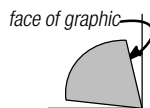


The face of the graphic is +/- 10° from vertical.

**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. Click here for a [detailed map](#).

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



For reflective films only: The face of the graphic is greater than 10° from vertical and greater than 45° from horizontal. This includes non-vertical surfaces of vehicle or fleet graphics.

**B. Graphic Construction**

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

**C. Graphic Protection**

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

## D. Graphic Types

*As identified in Warranty Period Tables*

<b>Indoor Signs</b>	Stationary graphics applied indoors and <i>not</i> exposed to the elements.
<b>Outdoor Signs</b>	Stationary graphics applied outdoors and exposed to the elements.
<b>OEM</b>	Labels and decorative graphics produced for and used by original equipment manufacturers. May also be called decals.
<b>Decals</b>	A small graphic used indoors or outdoors for decoration, information or identity.
<b>Vehicle Types</b>	<b>Vehicle.</b> Buses, vans, passenger vehicles, delivery trucks, pickup trucks, enclosed trailers.  <b>Straight Trucks, Semi-Tractors and Semi-Trailers.</b> Straight trucks, semi-tractors and semi-trailers used for commercial business purposes. Excludes air shields.

## 5. Warranty Information

### A. Warranty Coverage Overview

The Warranty coverage for each graphic is based on the user(s) both reading and following all applicable and current 3M Product and Instruction Bulletins. 3M will honor the Warranty Period stated in the base film's Product Bulletin that is current when the film was purchased. The Warranty Period 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.

### B. 3M Basic Product Warranty

This Product is 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 Warranties Brochure](#).

### C. Limitation of Liability

Except where prohibited by law, 3M SHALL NOT UNDER ANY CIRCUMSTANCES BE LIABLE TO PURCHASER OR USER FOR ANY DIRECT (EXCEPT FOR THE LIMITED REMEDY PROVIDED ABOVE), INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, LABOR, NON-3M MATERIAL CHARGES, LOSS OF PROFITS, REVENUE, BUSINESS, OPPORTUNITY, OR GOODWILL) RESULTING FROM OR IN ANY WAY RELATED TO SELLER'S PRODUCTS, SERVICES OR THIS BULLETIN. This limitation of liability applies regardless of the legal or equitable theory under which such losses or damages are sought including breach of contract, breach of warranty, negligence, strict liability, or any other legal or equitable theory.

### D. Limited Remedy

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.

### E. Additional Limitations

See the [3M Graphics Warranties Brochure](#) at [www.3Mgraphics.com](http://www.3Mgraphics.com), which gives the terms, additional limitations of the warranty, if any, and limitations of liability.

### F. 3M Performance Guarantee Warranty Period

Subject to Stipulations set forth in Section H, below

Graphics constructed with the 3M materials specified and in the exposure specified in the Warranty Period, Section F(1), are eligible for the 3M Performance Guarantee. This warranty only covers the performance of the recommended 3M products used in the graphic construction when imaged with the printers and OEM inks listed in the most current version of the [3M Performance Guarantee Matrix](#). The Matrix may also list certain restrictions for using the film covered in this Bulletin. For warranties for other exposures, see Section H(1) on page 8.

- (1) **Warranty Period**  
for 3M Product Performance  
Only in a Standard U.S. Vertical  
Exposure

VEH = Vehicles, Straight Trucks, Semi-Tractors and Semi-Trailers  
OUT = Indoor and Outdoor Signs  
DEC = Cut Letters and Decals  
See Section 4D for further definition.

Warranty Period for 3M Product Performance Only, in Years

Film	Graphic Protection	VEH	DEC	OUT	Inks and Printers*
IJ5100-10	8518 8519 1920DR 9740i		2	2	See the <a href="#">3M Performance Guarantee Matrix</a>

\* Some of the graphic protection products and graphic types may not be approved for this film on certain printing platforms. Always refer to the 3M Performance Guarantee Matrix.

**G. 3M™ MCS™ Warranty**

Subject to Stipulations set forth in  
Section H

Finished graphics constructed with the materials specified and the exposure specified in the Warranty Period, Section G(2), are eligible for the 3M™ MCS™ Warranty. For warranties for other exposures, see Section H(1) on page 8.

- (1) **Certificate of 3M™ MCS™ Warranty Requirement**

Only graphics manufacturers having a current Certificate of 3M™ MCS™ Warranty are eligible to extend this Warranty to their customers.

- (2) **Warranty Period**  
for Finished Graphics  
in a Standard U.S. Vertical  
Exposure

VEH = Vehicles, Straight Trucks, Semi-Tractors and Semi-Trailers  
OUT = Indoor and Outdoor Signs  
DEC = Cut Letters and Decals  
See Section 4D for further definition.

**a. 3M Inkjet Printing For Film IJ5100**

Warranty Period for Finished Graphics, in Years

Solvent Inks and Printers	EFI™ VUTEk® 150, 2360/3360, 3300/5300, 3000/5000			HP XL1200, XL 1500 Printers			HP Scitex TJ8300 and TJ8350 Industrial Presses		
	3M™ Ink Series 1500v2			3M™ Ink Series 4400			3M™ Ink Series 4800		
Graphic Protection	VEH	OUT	DEC	VEH	OUT	DEC	VEH	OUT	DEC
8518, 8519	4	3	4	4	3	4	4	3	4
1920DR	3	3	3	—	—	—	3	3	4
9740i	4	3	4	4	3	4	4	3	4

Solvent Inks and Printers	Seiko I Infotech ColorPainter™ H-74s, H2-74s, H-104s, H2-104s W-54s, & W-64s Printers			SIIT ColorPainter™ M-64s Printers		
	GX 3M Ink Series			SX 3M Ink Series		
Graphic Protection	VEH	OUT	DEC	VEH	OUT	DEC
8518, 8519	4	3	4	4	3	4
1920DR	3	3	3	3	3	3
9740i	4	3	4	—	—	—

Latex Inks and Printers	HP Designjet L65500 Printer and Scitex LX600, LX800, LX820 & LX850 Printers			HP Designjet L65500 Printer and Scitex LX600, LX800, LX820 & LX850 Printers			P Designjet L26100, L26500, L28500; Latex 210, 260 & 280 Printers		
	HP 3M LX600 Specialty Latex Ink			HP LX610 Latex Ink a 3M™ MCS™ Warranty Component			HP 792 Latex Ink a 3M™ MCS™ Warranty Component		
Graphic Protection	VEH	OUT	DEC	VEH	OUT	DEC	VEH	OUT	DEC
8518, 8519	3	2	3	3	2	3	3	2	3
1920DR	2	2	2	2	2	2	2	2	2

Warranty Period for Finished Graphics, in Years

Latex Inks and Printers	HP Latex 3000 Printer			HP Latex 360 Printer		
	HP 881 Latex Ink a 3M™ MCST™ Warranty Component			HP 831 Latex Ink a 3M™ MCST™ Warranty Component		
Graphic Protection	VEH	OUT	DEC	VEH	OUT	DEC
8518, 8519	3	2	3	3	2	3
1920DR	2	2	2	2	2	2

UV Inks and Printers	EFI™ VUTEK® PV200 Printer			EFI™ VUTEK® GS5000r and GS3250r Printer			EFI™ VUTEK® GS2000, GS3200, GS3250 Printers, including GS Pro Series		
	3M™ Ink Series 2200UV			GSr 3M™ Premium UV Inks			GS 3M™ Premium UV Inks		
Graphic Protection	VEH	OUT	DEC	VEH	OUT	DEC	VEH	OUT	DEC
8518, 8519	4	3	4	4	3	4	4	3	4
1920DR	—	—	—	2	2	2	2	2	2
9740i	4	3	4	3	2	3	3	2	3

UV Inks and Printers	EFI™ VUTEK® QS2000, QS3200, QS3220, QS220 Printers			EFI™ R3225 UV Roll-to-Roll Printers			EFI™ VUTEK® GS3250LXr and GS5500LXr Pro Printers		
	3M™ Ink Series 2800UV			R3235 3M™ UV Ink			EFI™ VUTEK® GSLXr 3M Superflex UV Ink <i>Warranty excludes white ink</i>		
Graphic Protection	VEH	OUT	DEC	VEH	OUT	DEC	VEH	OUT	DEC
8518, 8519	4	3	4	4	3	4	3	2	3
1920DR	—	—	—	2	2	2	—	—	—
9740i	4	3	4	3	2	3	3	2	3

UV Inks and Printers	Mimaki UJV-160, JFX-1631 & 1615R Printers			Mimaki UJV500-160 Printer		
	Mimaki Ink Series LF-200 <i>Manufactured by 3M</i>			Mimaki UV Ink LUS-200 <i>Manufactured by 3M</i>		
Graphic Protection	VEH	OUT	DEC	VEH	OUT	DEC
8518, 8519	4	3	4	4	3	4
1920DR	—	—	—	2	2	2
9740i	—	—	—	3	2	3

b. Screen Printing For Film Series 5100

Warranty Period for Finished Graphics, In Years

Graphic Protection	SOLVENT 3M™ Ink Series 2900			SOLVENT 3M™ Ink Series 1900			UV 3M™ Ink Series 9800		
	VEH	OUT	DEC	VEH	OUT	DEC	VEH	OUT	DEC
1920DR	4	3	4	4	3	4	—	—	—
9740i	4	3	4	4	3	4	4	3	4
9800CL	—	—	—	—	—	—	4	3	4

**H. General Warranty Stipulations for 3M™ MCS™ Warranty and 3M Performance Guarantee**

These stipulations apply to the 3M™ MCS™ Warranty and 3M Performance Guarantee. General provisions for these stipulations are covered in the [3M Graphics Warranties Brochure](#).

**(1) Reduced Warranty Period for Selected Graphic Exposures**

For each exposure shown below, multiply the Warranty Period (in years) in the applicable warranty, Section F(1) on page 6 or Section G(2) on page 6, for your graphic construction by the percentage shown for the intended graphic exposure. This is the reduced Warranty Period.

If the Outdoor Graphic Exposure is:	Multiply Warranty Period by this Percentage:	Examples
Desert Southwest Vertical	70% (0.7)	0.7 x 4 years = 2.8 years 0.7 x 2 years = 1.4 years
Non-vertical	0	0

**(2) Reduced Warranty Period for Graphics Exposed to Heat**

Long exposure to continuous high heat decreases the Warranty Period of this film by 2 years. High heat is a temperature above 150°F (65°C). It may occur in areas such as railroad locomotives, vehicle engine compartments, non-insulated tankers exposed to frequent internal steam cleaning, or compartments that carry hot cargo.

**(3) Application to Glass**

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

**(4) Application Outside the U.S.**

Contact the 3M organization for that country.

**(5) Graphics Made with Components Not Sold or Recommended by 3M**

The 3M™ MCS™ Warranty does not cover finished graphics made with ink, film, graphic protection and/or application tapes not sold or recommended by 3M. The user is solely responsible for the graphic appearance and performance of graphic constructions that include any other products.

The 3M Performance Guarantee covers selected 3M branded graphics products when used with qualified printers and inks.

**(6) Graphic Protection**

- Graphic protection can improve the appearance, performance and durability of your graphics. It is required for many warranted constructions. Refer to the Warranty Period tables for details.
- Any printed graphic exposed to abrasive conditions (including vehicles), harsh cleaners or chemicals must include graphic protection in order to be warranted. Abrasion damage and gloss loss are not covered.

**(7) Rivets**

This film may tent when applied over rivets. If the rivets are closely spaced, the film will likely bridge between rivets. Tented or bridged film may fail prematurely, which is not covered by any 3M warranty.

**6. Factors that Affect Graphic Performance Life**

The actual performance life of a graphic is affected by:

- the combination of graphics materials used.
- 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.



## 7. Graphics Manufacturing



### CAUTION

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

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### A. Inkjet Printing

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

(1) **Total Ink Coverage for 3M™ MCS™ Warranty Solutions**

**250%** is the maximum recommended total ink coverage for this film for all solvent, latex and UV inks.

Too high a total physical ink amount on the film results in media characteristic changes, inadequate drying, overlamine lifting, and/or poor graphic performance. Make sure that the ink lay down is within the limits of what the dryer can handle to prevent ink smearing. The Product & Instruction Bulletin for each 3M ink series includes additional details about total ink coverage.

(2) **Total Ink Coverage for 3M Performance Guarantee Solutions**

Refer to the [3M Performance Guarantee Matrix](#) for details.

(3) **Color Consistency**

Be sure to check the consistency of color on reflective film as it may appear different in daytime and nighttime lighting.

(4) **Adequately Dry Graphics**

***Important Note!***

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

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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 or applying the graphic. See the ink's Instruction Bulletin for more details.

### B. Screen Printing

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

- Solvent Ink series 1900 and some colors in UV ink series 9800 are opaque. Be aware that opaque ink can prevent the film from retroreflecting in the screen printed areas. Solvent ink series 2900 and the transparent colors from UV ink series 9800 are good choices when retroreflection is important in the screen printed areas.
- For graphics subjected to fuel vapors or occasional spills, use Solvent ink series 2900 and clear 1920DR.
- Oven dry the last color and the clear when using solvent-based inks on graphics needed for any corrugated application.

### C. Cutting and Weeding

See [3M Instruction Bulletin 4.1](#) for details.

(1) **Cutting Methods**

- Cold and hot steel-ruled die cutting
  - Hot kiss cutting
  - Drum-type electronic cutting
  - Flat-bed electronic cutting
  - Guillotine
  - Hand cut
  - Knifeless™ Tape
- 3M recommends using this product with our cast vinyl films. See <http://knifelesstech-systems.com/Home.aspx> for details, including videos and ordering information.

(2) **Minimum Cutting Sizes**

- Use a minimum letter height of 1 inch (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.

(3) Weeding Considerations

- For the best results, weed the film within 24 hours of cutting it.

D. Application Tapes

(1) When to Use Premasking Tape

- As an application aid to increase stiffness, and prevent stretching and damage during application.
- Graphics larger than 4 square feet (0.4 m<sup>2</sup>).
- Striping greater than 4 inches (10 cm) wide.

(2) When NOT to Use Premasking Tape

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

(3) When to Use Prespacing Tape

- Hold cut and weeded letters or graphics in registration after removing the film liner.
- Protect cut graphic parts from scratching or damage during application.
- Use when large amounts of liner are exposed.

(4) How to Select an Application Tape

Determine whether you want to premask the graphic or prespace cut graphics. Then select the application tape that corresponds to the graphic protection used. See [3M Instruction Bulletin 4.3](#) for complete details.

a. Inkjet Printing

		Select the tape based on what is on top of the graphic			
Application Tape	Inkjet Inks	1920DR	9740i	8518, 8519	
Premasking SCPM-3	All Inkjet Inks Specified in this Bulletin	■	—	■	
Prespacing SCPS-2		■	—	■	
Premasking SCPM-44X		—	■	—	
Prespacing SCPS-53X		—	■	—	

— = Use of application tape not recommended for this construction

b. Screen Printing

		Select the tape based on what is on top of the graphic		
Application Tape	Screen Print Inks	1920DR	9740i, 9800CL	
Premasking SCPM-3	Solvent 1900 Solvent 2900	■	—	
Premasking SCPM-44X	UV 9800	—	■	

— = Use of application tape not recommended for this construction

E. Substrate Considerations

**Important Note!**

This film is not recommended for use on low surface energy substrates such as some plastics, powder-coated paint, etc. The user must assume responsibility for testing and approving these substrates.

This film can be applied over other recommended 3M graphic systems. Graphics printed with clear 1920DR must be weathered for at least one year before applying this film over it. See [3M Instruction Bulletin 5.1](#)

8. Application and Installation

Install the film using the dry application method.

In addition to other Bulletins specified in this document, the following Bulletins provide details that you may need to successfully apply a graphic.

- Application, general procedures for indoor and outdoor dry applications. [3M Instruction Bulletin 5.5](#).

A. Adhesive

This film has a pressure-sensitive adhesive. It bonds to the surface even with light pressure and cannot be repositioned.

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

**B. Graphics Printed with UV Inkjet Inks are Heat Sensitive**

UV inkjet inks may crack if too much heat is used during graphic application to complex curves and deep contours as well as around rivets. When using a heat gun or other heat source during application, make sure the film surface temperature does not exceed 212°F (100°C).

Using additional heat in the post-application process may cause UV inkjet ink to crack.

For the best results **always do a test application** of a UV inkjet printed graphic to determine how much heat can be used without damaging the image.

**C. Edge Sealing**

- Most graphics made with these films do not require an edge sealer, although certain applications may benefit from its use.
- If needed or recommended, use [3M™ Edge Sealer 3950](#).
- 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.
  - Graphics applied to locomotives and rolling railroad stock.
  - Graphics applied to truck rollup doors.

**9. Maintenance and Cleaning**

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 [3M 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.

**10. Removal**

This film is a permanent film, which is not easily or cleanly removable. Refer to [3M Instruction Bulletin 6.5](#) for more information about removing permanent films.

**11. Shelf Life, Storage and Shipping**

**A. Shelf Life**

**Total shelf life: 3 years** from the date of manufacture on the original box. If you do process the film, do so within 2 years and apply within 1 year. If you do not process the film, apply it within 3 years.

**B. Storage Conditions**

for Unprocessed Film or Unapplied Finished Graphics

- 40° to 100°F (4° to 38°C)
- Out of sunlight
- Clean dry area
- Store unprocessed film in original container
- Cut sheets must lie flat
- Bring the film to print room temperature before using

**C. 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 [3M Instruction Bulletin 6.5](#) for details.

**12. Health and Safety**



**CAUTION**

When handling any chemical products, read the manufacturers' container labels and the Safety Data Sheets (SDS) for important health, safety and environmental information. To obtain MSDS sheets for 3M products go to [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. Standards**

This information is important for applications that are regulated by ASTM or NFPA® standards, for example, traffic control signs, emergency vehicles and certain railroad graphics. The user is solely responsible for determining and complying with all current and applicable local, state and federal regulations regarding the use and application of graphics materials.

**B. ASTM D4956-11a: Standard Specification for Retroreflective Sheeting for Traffic Control**

ASTM D-4956-11a covers flexible, non-exposed glass bead lens and microprismatic retroreflective sheeting designed for use on traffic control signs, delineators, barricades and other devices. For Type I sheeting it specially covers these colors: white, yellow, orange, green, red, blue and brown. As defined in ASTM D-4956-11a, film series 5100 and films IJ5100-10 (white) are classified as Type I sheeting (section 4.2.1) with a Class 1 adhesive (section 4.3.1). For corresponding colors covered by ASTM D-4956-11a, the aforementioned films (except orange) meet the requirements specified in section 6.1.1 (minimum performance requirements for Type I sheeting).

**C. NFPA® 1901: Standard for Automotive Fire Apparatus (2009 Edition)**

According to NFPA® 1901, section 15.9.3.3 specifies that all retroreflective materials required by section 15.9.3.1 and 15.9.3.2 shall conform to the requirements of ASTM D 4956, *Standard Specification for Retroreflective Sheeting for Traffic Control*, Section 6.1.1 for Type I sheeting. Section 15.9.3.3.1 specifies that colors not listed in ASTM D-4956 can be used on the front and sides of the fire apparatus as long as the sheeting has a minimum coefficient of retroreflection of 10 when measured with an observation angle of 0.2° and an entrance angle of -4°.

	Red	Ruby Red	Yellow	Lemon Yellow	White	Blue	Light Blue	Green	Gold	Black
<b>Color Number</b>	72	82	71	81	10	75	76	77	64	85
<b>Section 15.9.3.1 (Front &amp; Sides)</b>	●	●	●	●	●	●	●	●	●	●
<b>Section 15.9.3.2 (Chevrons)</b>	●	●	●	●						

**D. AAR: Standard and Recommended Practices**

This product is approved for use by the Association of American Railroads (AAR), Safety and Operations, as listed in the Manual of Standards and Recommended Practices, Section L - Lettering and Marking of Cars, Specification M-947, Adhesive-Backed Films.

**13. Bulletin Change Summary**

Modified and new content is marked with a black bar in the margin. Discontinued 3M Piezo Inkjet Ink Series 6200 for Agfa :Jeti 3312, 3318, 3324 & 5024 [Gandinnovations] Printers and 3M Piezo Inkjet Ink Series 2700UV for Durst Rho 160R & 351R Printers. Added SIIT SX 3M Ink Series for Seiko I Infotech ColorPainter™ M-64s Printer, HP 831 Latex Ink for HP Latex 360 Printer, and EFI™ VUTEK® GSLXr 3M Superflex UV Ink (*excludes White Ink*) for EFI™ VUTEK® GS3250LXr and GS5500LXr Pro Printers. Added requirement for Certificate of 3M™ MCS™ Warranty. The 3M Related Literature section has been replaced by direct links to the most current versions of Bulletins or warranty information you may need to successfully use this product. All links are blue underlined text.



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