



# Scotchlite™ Reflective Graphic Film

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

**Film 5100R-10** for Electrostatic Printing

**Films IJ5100R-10, RG5100R-10** for Piezo Inkjet Printing

## Product Description

These are 7-mil flexible, enclosed lens, removable, retroreflective films that offer excellent angularity. These films are well suited for cut letters, decals, vehicle markings and graphics, and non-regulated signage. Use these films for screen printing, piezo inkjet, electrostatic and thermal mass transfer printing.

### Advantages

- Up to 7 year durability, with a 4 year 3M™ MCS™ Warranty on most applications
- Designed for excellent cutting and weeding with computer sign cutting equipment
- Removable with heat
- Film series 5100R is available in 15 colors, including black (which reflects white)
- Similar daytime and nighttime appearance that retains most of its reflectivity when wet
- Unprocessed film resists fuel vapors or occasional spills
- Engineer grade film

## 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.

- Vehicle markings and graphics
- Cut letters and decals
- Non-regulated signage

## Limitations of End Uses

3M specifically does not recommend or warrant the following uses, but please contact us to discuss your needs or recommend other products.

### Unsuitable End Uses for This Film

- Do not apply this film on:
  - Walls
  - Corrugated or highly irregular surfaces
  - Substrates with compound curves
  - Substrates that do not have a clean, smooth surface or have poor paint-to-substrate adhesion
  - Stainless steel
  - FRP with a Tedlar® coating
  - Flexible substrates
- Graphics made for automotive Original Equipment Manufacturers (OEM); contact 3M Automotive Division at 1-800-328-1684 for alternatives.
- Also see limitations of graphic removal, page 6.

## Compatible Products

### 3M Graphic Materials

This Bulletin provides details about the base film and construction options and warranty. 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.

See the Warranty matrix to determine which Compatible Products are approved for your graphic construction.

#### Piezo Inkjet Printing

See the Warranty Matrix to determine if you need an IJ or RG prefix film.

#### Ink Series

- 3M™ Piezo Inkjet Ink Series 2200UV
- 3M™ Piezo Inkjet Ink Series 2600UVv2
- 3M™ Piezo Inkjet Ink Series 2700UV
- 3M™ Piezo Inkjet Ink Series 2800UV
- 3M™ Piezo Inkjet Ink Series 5400UV
- 3M™ Piezo Inkjet Ink Series 1500v2
  
- 3M™ Piezo Inkjet Ink Series 4400
- 3M™ Piezo Inkjet Ink Series 4600
- 3M™ Piezo Inkjet Ink Series 4800
- 3M™ Piezo Inkjet Ink Series 6000
- 3M™ Piezo Inkjet Ink Series 6800

#### Printer

EFI™ VUTEK® PV 200 Printer  
 3M™ Printer 2500UV  
 Durst Rho 160R and 351R Printer  
 VUTEK® QS2000 and QS3200  
 HP Designjet H35000/H45000  
 EFI™ VUTEK® 150, 2360/3360, 3300/5300 and 3000/5000 Printers  
 HP XLJet Series 1200, 1500  
 HP Scitex Pressjet-W™ Printer  
 HP Scitex TJ8300 Series Digital Press  
 Océ Arizona 30s Printer  
 Océ Arizona 180 and 90 Printers

#### Graphic Protection Options

- 3M™ Scotchcal™ Gloss Overlamine 8518
- 3M™ Scotchcal™ Luster Overlamine 8519
- 3M™ Screen Printing Gloss Clear 9800CL
- 3M™ Screen Print Gloss Clear 1920DR
- 3M™ Screen Print UV Gloss Clear 9720i
- 3M™ Screen Print Gloss Clear 9720UV
- 3M™ Scotchlite™ Screen Printing Gloss Clear 4430R
- 3M™ High Gloss Graffiti Resistant Overlamine 8912 ES *not for use on rivets*
- 3M™ Screen Print Clear 8920 ES *not for use on corrugations*

#### Other Products

- 3M™ Prespacing Tape SCPS-2
- 3M™ Premasking Tape SCPM-3
- 3M™ Premasking Tape SCPM-44X
- 3M™ Prespacing Tape SCPM-53X
- 3M™ Edge Sealer 3950

## Characteristics

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

#### Physical Characteristics

Characteristic	Value
Material	Vinyl
Thickness	<b>With adhesive:</b> 7 to 8 mils (0.18 to 0.20 mm)
Adhesive type	Pressure-sensitive
Liner	Polyethylene-coated paper

*Continued on the next page.*

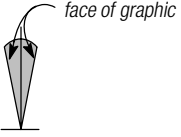
Physical Characteristics. *Continued*

Characteristic	Value																																																			
Film colors & typical retroreflection	<p>At -4° entrance angle and 0.2° observation angle.</p> <table border="1"> <thead> <tr> <th>Film Number</th> <th>Color Name</th> <th>Typical Coefficient of Retroreflection</th> </tr> </thead> <tbody> <tr> <td>5100R-10</td> <td>White</td> <td>100</td> </tr> <tr> <td>IJ, RG5100R-10</td> <td>White</td> <td>100</td> </tr> <tr> <td>5100R-14</td> <td>Orange</td> <td>20</td> </tr> <tr> <td>5100R-64</td> <td>Gold</td> <td>70</td> </tr> <tr> <td>5100R-65</td> <td>Rich Gold</td> <td>65</td> </tr> <tr> <td>5100R-71</td> <td>Yellow</td> <td>65</td> </tr> <tr> <td>5100R-72</td> <td>Red</td> <td>20</td> </tr> <tr> <td>5100R-74</td> <td>Royal Purple</td> <td>5</td> </tr> <tr> <td>5100R-75</td> <td>Blue</td> <td>10</td> </tr> <tr> <td>5100R-76</td> <td>Light Blue</td> <td>10</td> </tr> <tr> <td>5100R-77</td> <td>Green</td> <td>20</td> </tr> <tr> <td>5100R-78</td> <td>Light Green</td> <td>20</td> </tr> <tr> <td>5100R-79</td> <td>Brown</td> <td>5</td> </tr> <tr> <td>5100R-81</td> <td>Lemon Yellow</td> <td>75</td> </tr> <tr> <td>5100R-82</td> <td>Ruby Red</td> <td>15</td> </tr> <tr> <td>5100R-85</td> <td>Black</td> <td>30</td> </tr> </tbody> </table> <p>See page 10 for ASTM and NFPA standards for this series.</p>	Film Number	Color Name	Typical Coefficient of Retroreflection	5100R-10	White	100	IJ, RG5100R-10	White	100	5100R-14	Orange	20	5100R-64	Gold	70	5100R-65	Rich Gold	65	5100R-71	Yellow	65	5100R-72	Red	20	5100R-74	Royal Purple	5	5100R-75	Blue	10	5100R-76	Light Blue	10	5100R-77	Green	20	5100R-78	Light Green	20	5100R-79	Brown	5	5100R-81	Lemon Yellow	75	5100R-82	Ruby Red	15	5100R-85	Black	30
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Retroreflection Definition	<p>The typical coefficient of retroreflection defined is measured at a -4° entrance angle and a 0.2° observation angle. It is expressed in candle-power per foot-candle per square foot (candela/lux/square meter) per ASTM E 810.</p> <p>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.</p> <p>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.</p>																																																			
Chemical resistance	<ul style="list-style-type: none"> <li>Resists mild alkalis, mild acids, and salt</li> <li>Excellent resistance to water (<i>not immersion</i>)</li> <li>Resists occasional fuel spills</li> </ul>																																																			
Flammability	Call 1-800-328-3908 for information																																																			

Application Characteristics

Characteristic	Value
Finished graphic application recommendation	<p><b>Surface type:</b> Flat, with/without rivets; moderate curves</p> <p><b>Substrate type:</b> Aluminum, FRP, paint</p> <p><b>Graphic orientation:</b> Vertical only</p> <p><b>Application temperature:</b> <i>air and substrate</i></p> <ul style="list-style-type: none"> <li>50° to 85°F (10° to 29°C) flat surfaces without rivets</li> <li>55° to 85°F (7° to 29°C) flat surfaces with rivets, curves</li> </ul> <p><b>Application method:</b> Dry</p>
Adhesion 24 hours after application	<p><b>Aluminum:</b> 4.8 lb/in (0.86 kg/cm)</p> <p><b>FRP (Fiberglass Reinforced Plywood):</b> 3.0 lb/in (0.5 kg/cm)</p> <p><b>Painted aluminum panels:</b> 2.6 lb/inch (0.5 kg/cm)</p>
In use temperature range	-30° to +200°F (-34° to +93°C)
Graphic removal	Easily removable with heat from most substrates within specified warranty period

## Definitions

<b>Exposure</b>	<b>U.S. Vertical Exposure</b>	 <p>The face of the graphic is +/- 10° from vertical.</p>
	<b>U.S. Desert Southwest Exposure</b>	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>Graphic Types</b>	<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.
	<b>Fleet Vehicle</b>	Straight trucks, semi-tractors and trailers used in commercial fleets. Excludes air shields.
	<b>Standard Vehicle</b>	Buses, vans, automobiles, recreational vehicles unless otherwise noted.
<b>Graphic Construction</b>	The products used to make a graphic, which may include film and/or flexible substrate, graphic protection, ink, printer and application tape.	
<b>Graphic Protection</b>	Overlaminated films or clear coats used to protect the graphic and/or change gloss.	
<b>Removable with Heat</b>	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.	

## Warranty Information

<b>Warranty and Limited Remedy</b>	<p>The following is made in lieu of all other express or implied warranties, including any implied warranty of <b>merchantability</b> 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. <b>In no case shall 3M be liable for any direct, indirect, or consequential damages, including any labor or non-3M materials charges.</b></p> <p>See the <i>3M Graphics Market Center Warranty Brochure</i> at 3Mgraphics.com, which gives the terms, additional limitations of the warranty, if any, and limitations of liability.</p>
<b>Warranty Coverage Overview</b>	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 Warranted Durability Table 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.

### 3M™ MCS™ Warranty

Warranted Durability Table  
for Finished Graphics  
in a Standard U.S. Vertical Exposure

### Piezo Inkjet Graphics

Use IJ prefix films unless otherwise noted.

Finished graphics constructed as shown in the tables below are eligible for the MCS Warranty. For warranties for other exposures, see page 6.

Warranted Durability in Years

Ink Series	VUTEK® 150, 2360/ 3360, 3300/5300, 3000/5000			XLJet Series 1200, 1500			Pressjet™ -W			TJ8300 Series Digital Press		
	1500v2			4400			4600			4800		
Graphic Protection	Veh	Out	In	Veh	Out	In	Veh	Out	In	Veh	Out	In
8519	4	3	4	4	3	4	4	3	4	4	3	4
1920DR	—	—	—	—	—	—	4	3	4	3	3	4
9720UV	—	—	—	—	—	—	4	3	4	4	3	4
9720i	4	3	4	4	3	4	4	3	4	4	3	4

Warranted Durability in Years

Ink Series	Arizona 30s			Arizona 180 and 90			VUTEK® PV200		
	6000			6800 <i>Use RG films</i>			2200UV		
Graphic Protection	Veh	Out	In	Veh	Out	In	Veh	Out	In
8519	4	3	4	4	3	4	4	3	4
1920DR	4	3	4	4	3	4	—	—	—
9720UV	4	3	4	4	3	4	4	3	4
9720i	4	3	4	4	3	4	4	3	4

Ink Series	Printer 2500UV			Rho 160R and 351R			VUTEK® QS2000 and QS3200			Designjet H35000 and H45000		
	2600UVv2			2700UV			2800UV			5400UV		
Graphic Protection	Veh	Out	In	Veh	Out	In	Veh	Out	In	Veh	Out	In
8519	4	3	4	4	3	4	4	3	4	4	3	4
1920DR	4	3	4	—	—	—	—	—	—	—	—	—
9720UV	4	3	4	4	3	4	4	3	4	4	3	4
9720i	4	3	4	4	3	4	4	3	4	4	3	4

### Screen Print Graphics

For all colors of film series 5100R

Warranted Durability in Years

Ink Series	2900			1900			UV 9800		
	Veh	Out	In	Veh	Out	In	Veh	Out	In
1920DR	4	3	4	4	3	4	—	—	—
4430R	4	3	4	—	—	—	—	—	—
9720UV	4	3	4	4	3	4	4	3	4
9720i	4	3	4	4	3	4	4	3	4
9800CL	—	—	—	—	—	—	4	3*	4

\* Ink series 9800 with 9800CL is removable for up to 3 years for outdoor signs

## Electrostatic Printed Graphics

For film 5100R-10 only

*Warranted Durability in Years*

Toner	8700		
Graphic Protection	Veh	Out	In
8519	4	3	4
8914	4	3	4
8912	4	3	4
8920	4	3	4

## Unprinted Film

*Durability In Years*

Graphic Protection	Veh	Out
None	4	4
None	7	7

For Unprinted Film only, both a Warranted Durability and Expected Durability is given. The film is covered by the MCS Warranty for the period described, but 3M testing shows that when unprinted, the film can be expected to perform satisfactorily for the extended period given.

**Warranted Durability**

**Expected Durability**

## Removal Warranty

For Films that Are Removable with Heat and/or Chemicals

Within the stated warranted durability period of each graphic construction in this Bulletin, if this film cannot be removed with heat and/or chemicals, or if more than 30% of the adhesive residue remains on the substrate, 3M will reimburse a reasonable portion of extra removal costs.

### Removal Warranty Exceptions

The following exceptions are not covered by the Removal Warranty.

- Substrate damage due to:
  - removing film from a pre-existing graphic
  - removing film that was applied to painted wallboard
  - removing film from paint that is not firmly bonded to the substrate
- No guarantee is made for:
  - ease or speed of removal of any graphic
  - removal from railroad, stainless steel or bare aluminum substrates
  - removal from paint that is improperly cured
  - removal from aged paint or metals, surface oxidation or chalking; user must test, approve and accept liability for such applications
  - removal from horizontally-exposed outdoor applications

## General Warranty Stipulations

### Reduced Warranted Durability

For Graphics NOT in a U.S. Vertical Exposure

Use the years indicated in the applicable Warranted Durability Table, starting on page 5, for your graphic construction and these formulas to determine reduced durabilities for the following graphic exposure.

If the Graphic Exposure is:	Use this Percentage of U.S. Vertical Exposure, Warranted Durability	Examples
Desert Southwest Vertical	70% (0.7)	0.7 x 5 years = 3.5 years 0.7 x 3 years = 2.1 years
All other exposures	0	0

### 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.

### Application to Glass

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

### 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 inks, film, graphic protection and/or application tapes 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 other products.

### Graphic Protection

Any 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.

### Rivets

This film will tent when applied over rivets. If the rivets are closely spaced, the film will bridge between rivets. Tented or bridged film may fail prematurely, which is not covered by any 3M warranty. For the best appearance and durability, 3M recommends cutting around the rivet and then re-squeegeeing around the rivet.

## 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
- 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

## Piezo Inkjet Printing

### Ink

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

### Total Ink Coverage

**250%** is the maximum recommended total ink coverage for this film for all solvent 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.

Note: Be sure to check the consistency of color on reflective film as it may appear different in daytime and nighttime lighting, particularly with 3M ink series 4600.

### Important Note! Adequately Dry Graphics

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.

## 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.

- 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.
- For graphics subjected to fuel vapors or occasional spills, use screen printing ink series 2900 and clear 4430R.
- Oven dry the last color and the clear when using solvent-based inks on graphics needed for any corrugated application.

## Electrostatic Printing

Refer to the 3M Related Literature section for Instruction Bulletins that discuss digital printing methods.

An image is printed on electrostatic paper and transferred with heat and pressure to the film. Graphic protection is required.

## Cutting

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

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

### Design Considerations

- 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).
- For uniform color and brightness when making a graphic with multiple pieces of the film together, be sure the pieces are properly color matched. See Instruction Bulletin 2.1 for details. Color-matched film is available by special order. Contact your 3M sales representative.
- Order "roll applicator splices" for roll striping. Butt splices may have a small gap.

### Weeding Considerations

- For the best results, weed the film within 24 hours of cutting it.
- Refer to Instruction Bulletin 4.1 for more details.

## Application Tapes

### 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.

### 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.

### 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.

### How to Select a 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 Instruction Bulletin 4.3 for complete details.

### Piezo Inkjet Printing

#### Graphic Protection

Application Tape	Piezo Inkjet Inks	1920DR	9720i 9720UV	8519	8518
Premasking SCPM-3	All	■		■	
Prespacing SCPS-2		■		■	■
Premasking SCPM-44X			■		
Prespacing SCPS-53X			■		



## Screen Printing

Application Tape	Ink or Toner	1920DR	9720i 9720UV 9800CL	4430
Premasking SCPM-3	1900	■		■
Prespacing SCPS-2	2900	■		■
Premasking SCPM-44X	9800	■	■	
Prespacing SCPS-53X		■	■	

## Electrostatic Printing

Application Tape	Toner	1920DR	8920	8519 8912 8914
Premasking SCPM-3	8700	■		■
Prespacing SCPS-2		■		■
Premasking SCPM-44X		■	■	
Prespacing SCPS-53X		■	■	

## No Printing or Graphic Protection

Premasking Tape SCPM-3  
Prespacing Tape SCPS-2



### CAUTION

Before using any equipment, always read the manufacturer's instructions.

## Application and Installation

Install the film using the dry application method.

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.

## Substrate Considerations

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 Instruction Bulletin 5.1 for details.

## Finishing

- If needed or recommended, use edge sealer 3950.
- 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
  - graphics applied to chrome substrates
  - graphics applied to locomotives and rolling railroad stock
  - graphics applied to truck rollup doors

## 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 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.

## Removal

These films are removable with heat from most substrates within the warranted durability period specified for your construction. See Instruction Bulletin 6.5 for details on how to remove graphics.

## Shelf Life, Storage and Shipping

### Shelf Life

#### Total shelf life: 2 years

Up to 2 years unprocessed, *OR* process within 1 year *and* apply within 1 year of processing

### Storage Conditions

for Unprocessed Film or  
Unapplied Finished Graphics

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

### 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 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.

## Standards

### ASTM D-4956-07: Standard Specification for Retroreflective Sheeting for Traffic Control

ASTM D-4956-07 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-4956-07, film series 5100R and films IJ/RG5100R-10 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-4956-07, the aforementioned films (except orange) meet the requirements specified in section 6.1.1 (minimum performance requirements for Type I sheeting).

Note: Film 5100R-78 (Light Green) and 5100R-79 (Brown) are new products that are currently being tested for compliance with ASTM D 4956-07.

### 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
Color Number	72	82	71	81	10	75	76	77	64	85
Section 15.9.3.1 (Front & Sides)	●	●	●	●	●	●	●	●	●	●
Section 15.9.3.2 (Chevrons)	●	●	●	●						

## 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

	<b>Subject</b>	<b>Type</b>	<b>Bulletin No.</b>	
<b>Inks</b>	3M™ Piezo Inkjet Ink Series 1500v2	PB-IB	1500	
	3M™ Piezo Inkjet Ink Series 4400	PB-IB	4400	
	3M™ Piezo Inkjet Ink Series 4600	PB-IB	4600	
	3M™ Piezo Inkjet Ink Series 4800	PB-IB	4800	
	3M™ Piezo Inkjet Ink Series 6800	PB-IB	6800	
	3M™ Piezo Inkjet Ink Series 2200UV	PB-IB	2200UV	
	3M™ Piezo Inkjet Ink Series 2600UVv2	PB-IB	2600UVv2	
	3M™ Piezo Inkjet Ink Series 2700UV	PB-IB	2700UV	
	3M™ Piezo Inkjet Ink Series 2800UV	PB-IB	2800UV	
	3M™ Piezo Inkjet Ink Series 5400UV	PB-IB	5400UV	
	3M Graphic Protection Products	PB	GP-1	
	3M™ Screen Print UV Gloss Clear 9720i	PB-IB	9720i	
	3M™ Screen Print Gloss Clear 9720UV -Applying screen printing clear 9720UV	PB IB	9700 3.4	
<b>Electrostatic Printing</b>	3M™ Screen Printing Ink Series 1900 and Clear 1920DR - Screen printing with ink series 1900- line color	PB IB	1900 3.12	
	3M™ Scotchlite™ Screen Printing Ink Series 2900 - Screen printing with ink series 2900 - line color - 4-color	PB IB IB	2900 3.18 3.19	
	3M™ Screen Printing UV Ink Series 9800 - Screen printing with UV ink series 9800 - line color - 4-color	PB IB IB	9800 3.20 3.21	
	3M™ Trident Transfer Paper	PB	Trident	
	Transferring and laminating electrostatically printed images	IB	4.7	
	3M™ Screen Print Clear 8920 ES - Screen printing with clear 8920 ES	PB IB	8920 3.15	
	<b>General Instructions</b>	Cold roll lamination	IB	4.22
		Design of graphics	IB	2.1
		Scoring and cutting	IB	4.1
		Using 3M application tapes; premasking and prespacing for films	IB	4.3
Application, substrate selection, preparation, substrate-specific techniques		IB	5.1	
Application, special applications and vehicles		IB	5.4	
Application, general procedures for indoor and outdoor dry applications		IB	5.5	
Applicator's quick reference guide for vehicle film		IB	5.35	
Application: special considerations for complex contours of automobiles, vans and buses and inspection forms		IB	5.36	
Storage, handling, maintenance, removal		IB	6.5	
<b>Warranty</b>	3M Graphics Center Warranty Brochure	go to <a href="http://www.3Mgraphics.com">www.3Mgraphics.com</a> , Warranties		

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## Bulletin Change Summary

These colors have been added: orange (-14), Rich Gold (-65), Royal Purple (-74), Light Green (-20), Brown (-79), Lemon Yellow (-81). Therefore, the information on ASTM D-4956-07 and NFPA 1901 on page 10 has been updated. Film FN5100R is no longer available.



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