

Series 5100R IJ5100R-10

Product Description

- Series 5100R for Screen Printing and Thermal Mass Transfer
- IJ5100R-10 for Solvent, UV, and Latex Inkjet Printing
- 7-mil, flexible, enclosed lens, retroreflective, engineer films that offer flexibility and versatility

Product Features

- 5100R Series available in 15 colors, including black (which reflects white)
- Similar daytime and nighttime appearance that retains most of its reflectivity when wet
- Excellent angularity
- Pressure-sensitive adhesive
- 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
- Removable with heat and/or chemicals
- Expected Performance Life of 7 years (unwarranted period for unprinted film with no graphic protection, applied to a flat, vertical, outdoor surface)

Recommended Types of Graphics and End Uses

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

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.

IMPORTANT NOTE

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 temperature are lower than 75 °F (24 °C). This film is not recommended for use on stainless steel.

Recommended Compatible Products

See 3Mgraphics.com/warranties for a complete list of compatible products that 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.

OEM Inkjet Inks and Printers for the 3M Performance Guarantee

See the [3M Performance Guarantee Matrix](#) for a complete list of compatible OEM Inkjet Inks and Printers that are approved by 3M for use with the base film covered in the Bulletin and used for the creation of a graphic that may be eligible for the 3M Performance Guarantee.

Quick Links

- [3M Graphics Warranties](#)
- [Technical Information Selector](#)
- [Safety Data Sheets \(SDS\)](#)
- [Flammability \(ASTM E84 Reports\)](#)
- [Videos](#)

Some of these links lead to web-based resources that are not product-specific.

Screen Printing

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

Graphic Protection

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

Application Tapes

See [3M Instruction Bulletin AT-1](#) to determine what application tape is recommend for your film or finished graphic.

Other Products

- [3M™ Edge Sealer 3950](#)

Certificate of 3M™ MCS™ Warranty

Graphic manufacturers who produce digitally printed graphics made with all 3M Graphics Products, including 3M Ink purchased through a qualified 3M Distributor or 3M Printing Partner, may register to be recognized with a Certificate of 3M™ MCS™ Warranty. Only graphic manufacturers having a current Certificate of 3M™ MCS™ Warranty are eligible to extend this warranty to their customers.

NOTE: For non-digitally printed Finished Graphics, check your eligibility for the 3M™ MCS™ Warranty by viewing the Warranty Period found within the Product Bulletin or using the warranty selector at www.3mgraphics.com/warranties.

Characteristics

These are typical values for unprocessed product. Processing may change the values.

Physical Characteristics

Characteristic	Value
Material	Vinyl
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 candlepower per foot-candle per square foot (candela/lux/square meter) per ASTM E810.</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>
Thickness	With adhesive: 7–8 mil (0.18–0.20 mm)
Adhesive	Pressure-sensitive
Adhesive Color	Clear with silver underneath
Liner	Polyethylene-coated paper

Characteristic	Value		
Adhesion, Typical 24 hours after application	Aluminum 4.8 pounds/inch (0.86 kg/cm) FRP (Fiberglass Reinforced Plywood) 3.7 pounds/inch (0.7 kg/cm) Painted aluminum panels 2.6 pounds/inch (0.5 kg/cm)		
Safety Standards	See "Health and Safety" on page 7 for ASTM, NFPA® and AAR information		
Chemical Resistance	<ul style="list-style-type: none"> Resists mild alkalis, mild acids, and salt Excellent resistance to water (<i>does not include immersion</i>) Resists occasional fuel spills 		
Film Colors and Typical Retroreflection	At -4° entrance angle and 0.2° observation angle.		
	Film	Color Name	Typical Coefficient of Retroreflection
	IJ5100R-10	White	100
	5100R-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
Flammability	Call 1-800-328-3908		

Application Characteristics

Characteristic	Value
Finished Graphic Application Recommendation	Surface type: flat, with and without rivets, moderate curves Substrate type: aluminum, Fiberglass Reinforced Plywood (FRP), paint Graphic orientation: Vertical only Application method: Dry Application temperature: air and substrate <ul style="list-style-type: none"> Flat without rivets: 50–85 °F (10–29 °C) Flat with rivets: 55–85 °F (15–29 °C)
Temperature Range After Application	-30 to +200 °F (-34 to +93 °C) (not for extended periods of time at the extremes)
Removal	Removable with heat and/or chemicals from most substrates within specified warranty period

Warranty Information

Warranty Coverage Overview

The warranty coverage for eligible graphics is based on the user both reading and following all applicable and current 3M Graphics Product and Instruction Bulletins. The warranty period for eligible graphics is as stated in the 3M Graphics Warranties Matrices, found at 3Mgraphics.com/warranties, at the time that 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 warranties set forth in this Bulletin are made in lieu of all other express or implied warranties, including any implied warranty of merchantability, fitness for a particular purpose, or arising out of a course of dealing, custom, or usage of trade.

3M Basic Product Warranty

3M Graphics Products are warranted to be free of defects in materials and manufacture at the time of shipment and to meet the specifications stated in its applicable 3M Graphics Product Bulletin and as further set forth in the [3M Graphics Warranties Bulletin](#).

Limited Remedy

The limited remedy applicable to each warranty is addressed in the 3M Graphics Warranties Bulletin found at [3MGraphics.com/warranties](#).

Limitation of Liability

Except to the extent prohibited by law, 3M SHALL NOT UNDER ANY CIRCUMSTANCES BE LIABLE TO PURCHASER OR USER FOR ANY DIRECT (EXCEPT FOR THE LIMITED REMEDY PROVIDED HEREIN), 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 3M'S GRAPHICS 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.

Warranty Period Matrices - Inkjet

See the ink/printer platform warranty matrices at [3MGraphics.com/warranties](#), for vertical warranty period information specific to your inkjet film.

Warranty Period Matrices - Screen Print

Table A. Screen Print Warranty Period (in years) for Film Series 5100R Finished Graphics in a Standard U.S. Vertical Exposure (see [3M Graphics Warranties Bulletin](#) for Graphic Type Definitions).

Graphic Protection	Screen Print Solvent Ink Series 2900			Screen Print Solvent Ink Series 1900			Screen Print UV 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

*DEC = Cut Letters and Decals

** Ink series 9800 with 9800CL or 9740i is removable for up to 3 years for outdoor signs

Warranty Period Matrices - Unprinted Film

Table B. Unprinted Film Warranty Period (in years) for Film Series 5100R Finished Graphics with no Graphic Protection in a Standard U.S. Vertical Exposure (see [3M Graphics Warranties Bulletin](#) for Graphic Type Definitions).

	Ink and Graphic Protection	VEH	OUT
3M™ MCS™ Warranty	None	4	4
*Expected Performance Life (Unwarranted period of time)	None	7	7

*Expected Performance Life is a good faith estimate of how long unprinted product may perform satisfactorily based on 3M testing. There is no warranty for performance or durability.

Reduced Warranty Period for Other Graphic Exposures

For other graphic exposures, determine the applicable reduced warranty period by multiplying the standard warranty period (in years) for your graphic construction as shown in the applicable warranty period tables by the percentage shown for the intended graphic exposure. See "Exposure Types" on page 3 of the 3M Graphics Warranties Bulletin for graphic exposure definitions.

Table C. Reduced Warranty Period for Other Graphic Exposures

If the Graphic Exposure is:	Use this Percentage of Vertical Exposure, Warranty Period	Calculation Examples
Desert Southwest Vertical	70%	0.7 x 7 years = 4.9 years
U.S. Horizontal	0%	0 x 4 years = 0 years

Factors that Affect Graphic Performance Life

The actual performance life of a graphic is affected by:

- the combinations of graphics materials used.
- complete 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.

Graphics Manufacturing



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

Inkjet Printing

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, latex and UV inks.

Do not exceed the recommended total ink coverage for the ink series used on this product. Having too high a total physical ink amount on the product results in media characteristic changes, incomplete drying, overlamine lifting, and/or poor graphic performance. For additional details about total ink coverage, refer to the 3M Product and Instruction Bulletin for 3M inks or the [3M Performance Guarantee Matrix](#) for OEM inks.



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

Completely Dry Graphics



Incomplete drying or curing can result in graphic failure including curling, increased shrinkage and adhesion failure, which are not covered under any 3M Graphic Warranty.

See the ink's 3M Product and Instruction Bulletin for more details.

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.

- Solvent ink series 1900 and some colors in the UV ink series 9800 are opaque. Be aware that opaque ink can prevent the film from retroreflecting in the screen printed areas. Solvent inks 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.

Cutting

See [3M Instruction Bulletin 4.1](#) for Sheeting, Scoring and Film Cutting details.

Graphic Protection

Graphic protection may improve the appearance, performance and durability of the graphic. Click on the graphic protection options listed in Product Bulletin or see the [3M Graphics Market Product Catalog](#), for more information.

Application Tapes

There are two types of application tapes. See [3M Instruction Bulletin AT-1](#) to determine what application tape is recommended for your film or finished graphic.

Premasking Tape

Increases stiffness during application while preventing stretching and damage. Use when little or no liner is exposed. See [3M Instruction Bulletin 4.3](#) for complete details.

Prespacing Tape

Holds cut and weeded letters or graphics in place during application and after removing the film liner, while preventing stretching and damage. Use when large amounts of liner are exposed. See [3M Instruction Bulletin 4.3](#) for complete details.

Application and Installation

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](#) for details.

In addition to other 3M Bulletins specified in this document, the following Bulletins provide details that you may need to successfully apply a graphic.

- [3M Instruction Bulletin 5.4](#). Application, Fleet Trucks.
- [3M Instruction Bulletin 5.5](#) Application, General Procedures for Interior and Exterior Dry Application

IMPORTANT NOTE

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 heat during application, make sure the film surface temperature does not exceed 212° F (100° C). For best results, **always do a test application** of a printed graphic to determine how much heat can be used without damaging the image.

Pressure-sensitive Adhesive

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

Maintenance and Cleaning

Use a cleaner designed for high-quality painted surfaces. The cleaner must be wet, non-abrasive, without solvents, and have a pH value between 3 and 11 (neither strongly acidic nor strongly alkaline). See [3M Instruction Bulletin 6.5](#) for details.

Removal

Removal requires heat and/or chemicals. The ease and rate of removal depends on a number of factors. See [3M Instruction Bulletin 6.5](#) for details.

Shelf Life, Storage and Shipping

Shelf Life

The shelf life is **never more than 3 years** from the date of manufacture on the original box.

If you process the film, the shelf life is changed to **1 year** from the processing date, but not later than the 3 year maximum from the manufacturing date.

Storage Conditions

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

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.

Health and Safety



CAUTION

When handling any chemical products, read the manufacturer's container labels and the Safety Data Sheets (SDS) for important health, safety and environmental information. To obtain SDS sheets for 3M products go to 3M.com/SDS, 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 manufacturer's instructions for safe operation.

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.

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

ASTM D-4956 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 specifically covers the following colors: White, Yellow, Orange, Green, Red, Blue, and Brown. As defined in ASTM D-4956, film series 5100R and film IJ5100R-10(white) are classified as Type I sheeting with a Class 1 adhesive. For the corresponding colors covered by ASTM D-4956, with the exception of Orange, film series 5100R meets the requirements specified in section 6.1.1.

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 D4956, *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 D4956 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)	•	•	•	•						

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.

Bulletin Change Summary

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. Please read the entire Bulletin thoroughly.

Release V APR-2016:

- Updated ASTM D4956 statement. See “ASTM D-4956: Standard Specification for Retroreflective Sheeting for Traffic Control” on page 7.

Release U DEC-2015:

- Removed warranty period information. This information can now be found using the Warranty Selector, found at www.3Mgraphics.com/Warranties

3M Commercial Solutions

3M Center
Building 220-12E-04
St. Paul, MN 55144-1000
1-800-328-3908
Fax 651-736-4233
3M.com/GRAPHICS

3M Canada

PO Box 5757
London, ON N6A 4T1
1-800-265-1840
Fax 519-452-6245

3M México S.A. de C.V.

Av. Santa Fe No. 55
Col. Santa Fe, Del. Alvaro Obregón
México D.F. 01210
General 5255-5270-0400
Fax 5255-5270-2277

3M Puerto Rico, Inc.

350 Chardon Avenue
Suite 1100
San Juan, PR 00918
General 787-620-3000
Fax 787-620-3018

