



Scotchlite™ Reflective Graphic Film

Series 580

For Cut Graphics, Screen Printing and Electrostatic Printing

Product Description

These are 7-mil, flexible, enclosed lens, retroreflective films that offer great versatility with a pressure-sensitive adhesive. These long-term durable films are designed for commercial vehicle, railroad and sign graphics, and striping on vertical, flat and curved surfaces, with or without rivets. Use these films for cut graphics, screen printing or electrostatic printing.

Advantages

- Similar daytime and nighttime appearance
- Excellent angularity
- Retains 90% of its retroreflectivity when totally wet
- Unprocessed film resists fuel vapors or occasional spills
- White film meets ASTM D 4956-07, Type 1

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. Please read the entire Bulletin for details.

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

Limitations of End Uses

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

- Not for wall graphics
- Not for application to FRP with a Tedlar® coating
- Not for application to stainless steel
- Graphics made for automotive Original Equipment Manufacturers (OEM); contact 3M Automotive Division at 1-800-328-1684 for alternatives.

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.

Screen Printing

- 3M™ Screen Printing Ink Series 1900
- 3M™ Screen Printing UV Ink Series 9800
- 3M™ Scotchlite™ Screen Printing Ink Series 2900

Electrostatic Printing

For film 580-10 only

- Scotchprint® Toner Series 8700/8800
- 3M™ Trident Transfer Paper

Graphic Protection Options

- 3M™ Scotchlite™ Screen Printing Gloss Clear 4430R
- 3M™ Screen Printing Gloss Clear 9800CL
- 3M™ Scotchcal™ Luster Overlamine 8908
- 3M™ High Gloss Graffiti Resistant Overlamine 8912 ES *for flat only applications.*
- 3M™ Scotchcal™ Luster Overlamine 8519
- 3M™ Screen Print Clear 8920 ES *not for use on corrugations*

Other Products

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

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																																				
Film colors & typical retroreflection	<p>At -4° entrance angle and 0.2° observation angle.</p> <table><thead><tr><th>Color Number</th><th>Color Name</th><th>Typical Coefficient of Retroreflection</th></tr></thead><tbody><tr><td>580-10*</td><td>White</td><td>100</td></tr><tr><td>580-14</td><td>Orange</td><td>20</td></tr><tr><td>580-64</td><td>Gold</td><td>70</td></tr><tr><td>580-71</td><td>Yellow</td><td>65</td></tr><tr><td>580-72</td><td>Red</td><td>20</td></tr><tr><td>580-75</td><td>Blue</td><td>10</td></tr><tr><td>580-76</td><td>Light blue</td><td>10</td></tr><tr><td>580-77</td><td>Green</td><td>20</td></tr><tr><td>580-81</td><td>Lemon yellow</td><td>75</td></tr><tr><td>580-82</td><td>Ruby red</td><td>15</td></tr><tr><td>580-85</td><td>Black</td><td>30</td></tr></tbody></table> <p>*Meets ASTM D 4956-07, Type 1</p>	Color Number	Color Name	Typical Coefficient of Retroreflection	580-10*	White	100	580-14	Orange	20	580-64	Gold	70	580-71	Yellow	65	580-72	Red	20	580-75	Blue	10	580-76	Light blue	10	580-77	Green	20	580-81	Lemon yellow	75	580-82	Ruby red	15	580-85	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 candlepower 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 at 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 to 8 mils (0.18 to 0.20 mm)																																				
Adhesive type	Pressure-sensitive																																				
Adhesive color	Clear with silver underneath																																				
Liner	Polyethylene-coated paper																																				
Chemical resistance	<ul style="list-style-type: none">• Resists mild alkalis, mild acids, and salt• Excellent resistance to water (<i>not immersion</i>)• Resists occasional fuel spills																																				
Flammability	Call 1-800-328-3908 for information																																				

Application Characteristics

Characteristic	Value
Finished graphic application recommendation	Surface type: Flat, with and without rivets; simple curves Substrate type: Aluminum, FRP, paint Graphic orientation: Vertical only Application temperature: <ul style="list-style-type: none"> 55° to 85°F (13° to 30°C) flat surfaces without rivets 60° to 85°F (15° to 38°C) flat or curved or surfaces with rivets Application method: Dry
Adhesion <i>Typical, 24 hours after application</i>	Aluminum: 5.0 pounds/inch (0.9 kg/cm) FRP (Fiberglass Reinforced Plywood): 3.9 lb/inch (0.7 kg/cm) Painted aluminum panels: 4.5 pounds/inch (0.8 kg/cm)
In use temperature range	-30° to +200°F (-34° to +93°C)
Graphic removal	Permanent

Warranty Information

The warranted durability 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 the following table(s), given in years, are for finished graphics exposed in a vertical exposure in the United States except the Desert Southwest.** See the warranty sections following this table for additional information.

3M™ MCS™ Warranty Durability for Finished Graphics

Veh - Vehicle Graphics
 Rail = Railroad Graphics
 Sign = General Signage

Screen Printing, All Film Colors	3M Ink	Series 2900				Series 1900			Series 9800					
		line color			4-color		line color			line color			4-color	
	Graphic Protection	Veh	Rail	Sign	Veh	Sign	Veh	Rail	Sign	Veh	Rail	Sign	Veh	Sign
	2920DR	7	5	5	5	5	—	—	—	—	—	—	—	—
	4430R	7	5	5	5	5	7	5	5	—	—	—	—	—
	9720i	7	5	5	5	5	7	5	5	7	5	5	5	5
	9720UV	7	5	5	5	5	7	5	5	7	5	5	5	5
	1920DR	—	—	—	—	—	7	5	5	—	—	—	—	—
	9800CL	—	—	—	—	—	—	—	—	5	5	5	5	5

No Printing	No Printing			
	Graphic Protection	Veh	Rail	Sign
	None	7	5	5

Electrostatic Printing, White Film Only	3M Toner	8700	
	Graphic Protection	Veh	Sign
	8908	—	1
	8519	5	5
	8912	4	5
	8920	5	4

3M™ MCS™ Warranty for Graphics in a Vertical Desert Southwest Location

Use the years of warranted durability indicated in the table on page 2 for your graphic construction and the following formulas to determine other durabilities.

Exposure	Percentage of U.S. Vertical Exposure	Example
Desert Southwest - Vertical	70% (0.7)	0.7 x 5 years= 3.5 years

Reduced Warranty for Graphics Exposed to Heat

Long exposure to continuous high heat decreases the performance life 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.

Warranty Details and General Exceptions

Definitions

Vertical Exposure



face of graphic

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

Desert Southwest

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 at www.3Mgraphics.com under Warranties.

Vehicles

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

Railroad

Refers to railroad cars but not railroad engines unless otherwise noted.

Factors that Affect Graphic Performance Life

The actual performance life of a graphic is affected by all of the following.

- Correct combination of 3M-recommended graphics products
- Ink formulation.
- Selection and preparation of the substrate.
- Surface texture.
- Application methods.
- Angle and direction of sun exposure.
- Environmental conditions.
- Cleaning or maintenance methods.

Application Outside the U.S.

Contact the 3M organization for that country.

Graphics Made with Components Not Sold or Recommended by 3M

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

Application to Glass

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

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.

Tenting Around Rivets

This film may tent around rivets, which is not covered by any 3M warranty.

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 or implied warranty arising out of a course of dealing, custom or usage of trade: all 3M products are warranted to be free of defects in materials and manufacture at the time of shipment and to meet the specifications stated in this Product Bulletin. 3M will replace or refund the price of any 3M materials that do not meet this warranty within the specified time periods. These remedies are exclusive. **In no case shall 3M be liable for any direct, indirect, or consequential damages, including any labor or non-3M materials charges.**

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

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 inches (2.5 cm).
- Use a minimum stroke width of 3/8 inch (1.0 cm).
- Use a minimum radius for a point of 1/16 inch (1.6 mm).
- 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

- Electronically-cut graphics may be difficult to cut and weed. The customer must assume responsibility for testing and approving this cutting method.
- Weed the film within 24 hours of cutting it. The adhesive may flow after cutting.
- Perform weeding carefully. Cut graphics do not re-adhere to the liner of film, if they are pulled off of it. For this same reason, do not attempt to exchange the liner.
- 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 m²).
- 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.

Tape	No Printing	1920DR 2920DR 4430R	9720i 9720UV 9800CL	8519	8912	8920
NR = not recommended						
Premasking SCPM-3	■	■		■	■	
Prespacing SCPS-2	■	■				
Premasking SCPM-44X			■			■
Prespacing SCPM-53X			■			

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.



CAUTION

Before handling any any equipment, always read the container label and the MSDS.

Adhesive

These films have a pressure-sensitive adhesive. Any pressure applied by hand, squeegee or application tool immediately bonds the film to the substrate. The film cannot be lifted and repositioned without damage.

Substrate Considerations

- This film can be applied over other recommended 3M graphic systems. Graphics printed with clear 2920DR must be weathered for at least one year before applying this film over it. See Instruction Bulletin 5.1 for details.

Finishing

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

Maintenance and Cleaning

Cleaning Graphics

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

This film is not removable.

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.

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. 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

Screen Print Inks & Graphic Protection

Electrostatic Printing & Graphic Protection

General Instructions

Warranty

Subject	Type	Bulletin No.
3M™ Screen Printing Ink Series 1900 and Overprint Clear VI0402 - 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™ Screen Print UV Gloss Clear 9720i	PB-IB	9720i
Scotchprint® Toner Series 8700/8800 - Using toner series 8700/8800	PB IB	8700 4.12
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
3M™ Scotchcal™ High Gloss Graffiti Resistant Overlamine 8912 ES	PB	8912
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 and substrate-specific application 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
3M Graphics Center Warranty Brochure	go to www.3Mgraphics.com, Warranties	

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Bulletin Change Summary

Reinstated as standard product.



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