



Scotchcal™ Graphic Film

Series 8000 and 8000LF

For Solvent and UV Screen Printing Only

1. Product Description

A. Product Features

- 2-mil opaque film
- Available in several colors with a paper line (Series 8000) or layflat liner (Series 8000LF)
- Pressure-sensitive adhesive
- Withstands severe weather and handling conditions encountered by commercial and industrial graphics
- Long term durability for fleet, sign and railroad graphics
- Permanent film
- Approved by the AAR (Association of American Railroads)

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™ MCST™ Warranty](#). Please read the entire Bulletin for details.

- Fleet and railroad car graphics including labels, emblems and striping
- Multicolor graphics and signs

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 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.

Expected Performance Life. 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 in a non-abusive environment.	10 years Unwarranted Period
3M™ MCST™ Warranty. 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 surface.	7 years Warranty Period

D. 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.

(1) Unsuitable End Uses for This Film

- Application to compound curves or corrugated surfaces.
- Graphics regularly subjected to gasoline vapors or spills.
- Graphics applied to stainless steel substrates.

2. Compatible Products

This section provides a list of 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 is covered by the 3M™ MCST™ Warranty. Refer to the Product and Instruction Bulletins listed in 3M Related Literature at the end of this Bulletin for more information about the compatible products.

(1) Screen Printing Inks

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

(2) Graphic Protection

- 3M™ Screen Print Gloss Clear 1920DR
- 3M™ Screen Print Low Gloss Clear 1930
- 3M™ Screen Print UV Gloss Clear 9740i
- 3M™ Screen Print Low Gloss Clear 9730UV
- 3M™ Screen Print UV Gloss Clear 9800CL

(3) Other Products

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

3. Characteristics

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

E. Physical Characteristics

Characteristic	Value		
Colors	Color	Paper Liner	Layflat Liner
	White	8000-10	8000LF-10
	Black	8000-12	8000LF-12
	Tomato red	8000-13	8000LF-13
	Bright orange	8000-14	8000LF-14
	Deep red	8000-23	8000LF-23
	Sapphire blue	8000-37	8000LF-37
	Bright yellow	8000-15	
	Vivid blue	8000-17	
	Sunflower	8000-25	
	Cardinal red	8000-53	
	Transparent	8000-114	
	Thickness	Without adhesive: 2-mils (0.05 mm) With adhesive: 3 to 4-mils (0.08 to 0.10 mm)	
Adhesive type	Pressure sensitive		
Adhesive color	8000-15, 8000-25 and 8000-114: Clear All others: Gray		
Liner	LF description: Polyethylene-coated paper All others: Kraft paper		
Tensile strength	5 pounds/inch at 73°F (minimum) (0.9 kg/cm at 23°C)		
Adhesion 24 hours after application	ABS: 4 pounds/inch (0.7 kg/cm) Acrylic enamel: 4 pounds/inch (0.7 kg/cm) Aluminum, anodized: 6 pounds/inch (1.1 kg/cm) Aluminum, etched: 6 pounds/inch (1.1 kg/cm) Chrome: 5 pounds/inch (0.9 kg/cm) Fruehauf painted panels: 4 pounds/inch (0.7 kg/cm)		
Chemical resistance	Resists mild acids, mild alkalis, and salts. Excellent resistance to water (does not include immersion)		

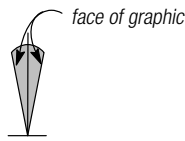
F. Application Characteristics

Characteristic	Value
Finished graphic application recommendation	Surface type: Flat, simple compound curves, with/without rivets Substrate type: ABS, painted metal, aluminum and chrome Application Method: Dry Minimum application temperature: 40°F (4°C) air and substrate
Applied film shrinkage	0.016 inch (0.41 mm)
Finished graphic exposure temperature	-65° to +225°F (-54° to +107°C)
Graphic removal	Fleet & Sign: Removable within the warranty period Railcars: Permanent on typical railcar substrate

4. Definitions

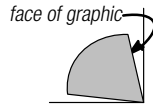
A. Exposure Types

U.S. Vertical Exposure



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

U.S. Non-vertical Exposure



The face of the graphic is greater than 10° from vertical and greater than 5° from horizontal. This includes non-vertical surfaces of vehicle wraps or fleet graphics.

U.S. Horizontal Exposure



The face of the graphic is +/- 5° from horizontal.

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. A detailed map is available at 3Mgraphics.com under Warranties.

B. Graphic Types

Indoor Signs

Stationary graphics applied indoors and not exposed to the elements.

Outdoor Signs

Stationary graphics applied outdoors and exposed to the elements.

OEM

Labels and decorative graphics produced for and used by original equipment manufacturers.

Vehicle Types

Vehicle. Buses, vans, passenger vehicles, delivery trucks, pickup trucks, enclosed trailers.

Straight Trucks, Semi-Tractors and Semi-Trailers. Straight trucks, semi-tractors and semi-trailers used for commercial business purposes. Excludes air shields.

Recreational Vehicle (RV). Vehicles used for personal pleasure, such as campers, motor homes and trailers, that are not used in connection with any commercial or business enterprise.

Railroad. Graphics applied on the exterior of railroad cars but not railroad engines.

C. Graphic Construction

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

D. Graphic Protection

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

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 Commercial Graphics Warranties Brochure](#).

C. 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.

D. 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.

E. Additional Limitations

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

F. 3M™ MCS™ Warranty

Subject to Stipulations set forth in Section G., below

Finished graphics constructed with the materials specified and the exposure specified in the Warranty Period Table, Section F.(1), is eligible for the 3M™ MCS™ Warranty. For warranties for other exposures, see Section G.(1).

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

Veh = Vehicle, RV, Straight Truck, Semi-Tractor and Semi-Trailer Graphics
Rail = Railroad Car Graphics
Signs = Indoor and Outdoor Sign Graphics

a. Unprinted Film

Film Color		Warranty Period <i>in years</i>		
Paper Liner	Layflat Liner	Veh	Rail	Sign
8000-10 8000-12	8000LF-10 8000LF-12	7	10 (8 + 2*)	7
8000-14 8000-15 8000-23	8000LF-14 8000LF-23	7	8	6
8000-13	8000LF-13	7	7	6
8000-17 8000-25 8000-37 8000-53	8000LF-37	6	6	6
8000-114	N/A	5	5	5

* Complete coverage for 8 years plus 2 additional years of coverage for adhesion and legibility only.

b. Printed Film

Film Color		Ink Series	Graphic Protection	Warranted Durability in years	
Paper Liner	Layflat Liner			Veh & Signs	Rail
8000 most colors	N/A	1900	1920DR Air dried	5	5
			1920DR Oven dried	6	6
			1930	2**	2**
			9740i	6	6
			9730UV	6	6
8000-114	N/A	1900	1920DR Air dried	5	5
			1920DR Oven dried	5	5
			1930	2**	2**
			9740i,	5	5
			9730UV	3	3
8000-10	8000LF-10	9800 line color	None	2	2
8000-12	8000LF-12		9800CL	7	7
8000-13	8000LF-13		9740i	7	7
8000-25			9730UV	3	3
8000-53					
8000-14	8000LF-14	9800 line color	None	2	2
			9800CL	7	6
8000-15	8000LF-15		9740i	7	6
			9730UV	3	3
8000-17	8000LF-23	9800 line color	None	2	2
8000-23	8000LF-37		9800CL	6	6
8000-37			9740i	6	6
			9730UV	3	3
8000-114	N/A	9800 line color	None	2	2
			9800CL	5	5
			9740i	5	5
			9730UV	3	3
8000-10	8000LF-10	9800 four color	9800CL	7	0
			9740i	7	0
			9730UV	3	0
8000 all colors	8000LF all colors	9800 metallic	9800CL	5	0
			9740	5	0

**May haze

G. General Warranty Stipulations for 3M™ MCS™ Warranty

(1) Reduced Warranty Period for Other Graphic Exposures

These stipulations apply to the 3M™ MCS™ Warranty. Also see the [3M Commercial Graphics Warranties Brochure](#)

For graphics oriented in a non-vertical or desert southwest, outdoor exposure, multiply the Warranty Period (in years) for your graphic construction as shown in the applicable Warranty Period Table, Section F.(1) by the percentage shown for the intended graphic exposure.

If the Graphic Exposure is	Use this Percentage of U.S. Vertical Exposure, Warranty Period	Warranty Period Calculation Examples
U.S. Non-vertical	50% (0.5)	0.5 x 7 years = 3.5 years
Desert Southwest Vertical	70% (0.7)	0.7 x 7 years = 4.9 years
Desert Southwest Non-vertical	35% (0.35)	0.35 x 7 years = 2.45 years
U.S. Horizontal	Warranted for legibility only. See Section 5. for more details.	

(2) 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. However, to help maintain the appearance of your graphic, use the recommended graphic protection whenever:
 - it is required for the construction and end use as shown in the Warranty Period tables.
 - the graphic is exposed to abrasive conditions, harsh cleaners or chemicals.
- Clear 1930 may haze, which is not warranted.

(3) Application to Glass

3M accepts no liability for glass breakage when using this film for window graphics. See [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 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.

6. Factors that Affect Graphic Performance Life

The actual performance life of a graphic depends on all of the following:

- correct combination of 3M-recommended graphics products.
- ink formulation.
- 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.

7. Graphics Manufacturing



CAUTION

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

A. 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.

B. Cutting

The following are common cutting methods for this film. See [Instruction Bulletin 4.1](#) for details.

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

C. Application Tapes

(1) When to Use Premasking Tape

- Use as an application aid to increase stiffness, and prevent stretching and damage during application.
- Use when little or no liner is exposed.

(2) When to Use Prespacing Tape

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

(3) How to Select a Tape

Determine whether you want to premask the graphic or prespace the film elements. Then locate the graphic protection on your graphic in the table below, and use the corresponding tape. See [Instruction Bulletin 4.3](#) for complete details.

EXAMPLE: If the film is protected by clear 9740i and you want to premask the film, use premasking tape SCPM-44X.

Select the tape based on what is on top of the graphic

Application Tape	Unprinted	1920DR, 1930	9740i 9730UV	9800 Ink Only	9800CL
Premasking SCPM-3	■	■	—	—	—
Prespacing SCPS-2	■	■	—	—	—
Premasking SCPM-44X	—	—	■	■	■
Prespacing SCPS-53X	—	—	■	■	■

— = This application tape is not recommended for the construction.

8. Application and Installation

A dry application method may be used, EXCEPT on vehicles, which must be dry applied.

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

A. Pressure-Sensitive Adhesive

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

9. Maintenance

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.) See [Instruction Bulletin 6.5](#).

Chalking on unprinted colored film can be washed off with normal graphic cleaning methods.

10. Removal

This is not a removable film. Removal requires a solvent-based or mechanical remover system. It may be very time consuming and may damage the substrate.

11. Shelf Life, Storage and Shipping

A. Shelf Life

Total shelf life: 3 years from the date of manufacture on the original box
Up to 3 years unprocessed, **OR** process within 2 years **and** apply within 1 year of processing

B. Storage Conditions

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

C. Shipping Finished Graphics

Flat, or rolled printed side out on 5 inch (13 cm) or larger core. This helps prevent the liner and, if used, the application tape from popping off.

12. 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.

13. 3M Related Literature

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

Subject	Type	Bulletin No.
3M™ Screen Printing Ink Series 1900 and Overprint Clear VI0402	PB	1900
- Screen printing with ink series 1900 - line color	IB	3.12
- Screen printing with ink series 1900 - 4-color	IB	3.11
3M™ Screen Printing UV Ink Series 9800	PB	9800
- Screen printing with UV ink series 9800 - line color	IB	3.20
- Screen printing with UV ink series 9800 4-color	IB	3.21
3M™ Screen Print UV Clears	PB-IB	UV Clears
Using 3M application tapes; premasking and prespacing for films	IB	4.3
Scoring and cutting	IB	4.1
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
Storage, handling, maintenance, removal	IB	6.5
3M Commercial Graphics Warranty Brochure		

14. Bulletin Change Summary

Black bars in the margins indicate an addition or change. Clear 9740i is a direct replacement for clears 9720i and 9720UV. Note that this film is approved for AAR (Association of American Railroads).



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