



Scotchcal™ Graphic Film

Series 3690 and 3690LF

For Solvent or UV Screen Printing Only

1. Product Description

A. Product Features

- 2-mil opaque film
- Available in white and black and clear (3690LF-114 only)
- Aggressive pressure-sensitive adhesive with gray pigment for good hiding power
- Film 3690LF features a layflat liner
- Adheres well to sand cast, moderately rough surfaces and some low surface energy materials
- Suitable for severe weather and handling conditions encountered by commercial and industrial graphics
- Permanent film

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

- Multicolor graphics including labels, emblems, and striping
- Small format original equipment manufacturer's (OEM) decorative and identification graphics, cautionary, safety and vandal-resistant labeling

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™ MCS™ 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 surface.	7 years Warranty Period

D. Limitations of End Uses

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

(1) Unsuitable End Uses for This Film

- Applications to corrugated surfaces
- Graphics regularly subjected to gasoline vapors or spills

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. Click on the blue underlined text, later in this Bulletin for more information about the compatible products.

(1) 3M 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 9740j](#)
- [33M™ Screen Print UV Matte Clear 9730UV](#)
- [3M™ Screen Print UV Gloss Clear 9800CL](#)

(3) OEM Inks and Clears *For OEM graphics only!*

- Sericol™ Duracal™ UV Screen Print Inks
- Sericol™ Duracal™ Screen Print Clear (*approved for OEM applications only*)

To identify a Sericol inks distributor, contact FUJIFILM® North America Corporation, Graphic Systems Division at http://www.fujifilmusa.com/products/graphic_arts_printing/index.html; 1101 W. Cambridge Drive, Kansas City, KS 66103; Tel: 1-800-255-4562 or 913-342-4060.

(4) Other Products

- [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.

A. Physical Characteristics

Characteristic	Value
Material	Vinyl, cast
Color	3690-10, 3690LF-10: White 3690-12, 3690LF-12: Black 3690LF-114: Clear
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	3690-10, -12 and 3690LF-10, -12: Gray-pigmented adhesive 3690LF-114: Clear adhesive
Liner	3690-10, -12: white kraft paper 3690LF-10, -12, -114: polyethylene-coated layflat paper
Tensile strength (<i>minimum</i>)	5 pounds/inch at 73°F (0.9 kg/cm at 23°C)
Adhesion <i>24 hours after application</i> Note: The adhesive becomes more aggressive as the surface temperature increases.	ABS: 5 pounds/inch (0.9 kg/cm) Acrylic enamel: 5 pounds/inch (0.9 kg/cm) Aluminum, anodized: 6 pounds/inch (1.1 kg/cm) Aluminum, etched: 5 pounds/inch (0.9 kg/cm) Chrome: 5 pounds/inch (0.9 kg/cm) Fiberglass: 5 pounds/inch (0.9 kg/cm) Powder coat paint: 3-6 pounds/inch (0.5-1.1 kg/cm) <i>value can vary greatly; contact your 3M representative to arrange for 3M to test your substrate</i>
Chemical resistance	Resists mild acids, mild alkalis, and salts. Excellent resistance to water (<i>does not include immersion</i>)

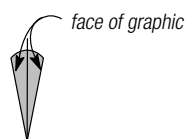
B. Application Characteristics

Characteristic	Value
Finished graphic application recommendation	<p>Surface type: Flat or moderate compound curves, with or without rivets; also sand-cast, moderately rough</p> <p>Substrate type: Most rigid plastics (including polyethylene and polypropylene), etched and anodized aluminum, chrome, fiberglass and paint</p> <p>Application temperature: 40° to 90°F (4° to 32°C) <i>air and substrate</i></p> <p>Application method: Dry</p>
Applied film shrinkage	0.047 inch (1.2 mm)
Finished graphic exposure temperature	-65° to +225°F (-54° to +107°C)
Graphic removal	Permanent

4. Definitions

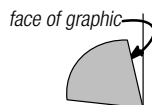
A. Exposure Types

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.

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

Overlaminates 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 eligible graphics for 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. 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 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 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

Ink Series	Graphic Protection	Warranted Durability <i>in years</i>
		Labels, Emblems, Stripping
None, unprinted	None	7
1900 (solvent), line color	1920DR	5
	1930	2
1900 (solvent), 4-color	9740i	5
	9730UV	3
9800 (UV), line color	None	0
	9800CL	5
	9740i	5
	9730UV	3
9800 (UV), 4-color	None	0
	9740i	5
	9800CL	5

(2) Warranty Period Table

for OEM Finished Graphics in a Standard U.S. Vertical Exposure, NOT in the U.S. Desert Southwest

Ink Series	Graphic Protection	Warranted Durability <i>in years</i>
		OEM Graphics Only
Sericol Duracal UV Screen Print Ink	Sericol Duracal UV Screen Print Clear	5

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 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 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 5 years = 3.5 years
Desert Southwest Non-vertical	35% (0.35)	0.35 x 5 years = 1.75 years
U.S. Horizontal	0%	0 years

(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 [3M Instruction Bulletin 5.1](#) for details.

(4) Application Outside the U.S.

Contact the 3M organization for that country.

(5) Chalking

The white film, when unprinted, has a tendency to chalk in outdoor applications. Film that cannot be cleaned must be protected by a recommended screen print clear. The warranty is the same as in the table for printed graphics.

(6) 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 is affected by all of the following.

- Combination of graphics materials used
- Ink formulation
- 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



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

A. Screen Printing and Graphic Protection

Formulations and processing conditions can affect ink durability. Refer to the Bulletins listed below for the limitations and proper usage for the 3Mink and/or graphic protection you are using.

[3M™ Screen Printing Ink Series 1900 and Overprint Clear VI0402](#)

- [Screen printing with ink series 1900 - line color](#)

- [Screen printing with ink series 1900 - 4-color](#)

[3M™ Screen Printing UV Ink Series 9800 and Clear 9800CL](#)

- [Screen printing with UV ink series 9800 - line color](#)

- [Screen printing with UV ink series 9800 4-color](#)

[3M™ Screen Print UV Gloss Clear 9740i and Matte Clear 9730UV](#)

B. Cutting

These are the common cutting methods for this film. If adhesive flowback occurs where the film is cut, weeding may be difficult. Therefore, we do not recommend using cutters that do not cut the liner, such as electronic or hot kiss cutters. See [Instruction Bulletin 4.1](#) for details.

- Band sawing
- Hand cutting
- Guillotine
- Cold / hot steel rule die cutter

C. Application Tapes

(1) When to Use Premasking Tape

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

(2) 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.

(3) How to Select a Tape

Determine whether you want to premask the graphic or prespace cut pieces of film such as letters. Then locate the graphic protection used on your graphic in the table below, and use the corresponding tape. See [3M Instruction Bulletin 4.3](#) for complete details.

EXAMPLE: To premask a film that has clear 1920DR as the top layer, use premasking tape SCPM-3.

Tape	Select the tape based on what is on top of the graphic		
	Unprinted Film	1920DR 1930	9800CL 9740i 9730UV Duracal Clear
Premasking SCPM-3	■	■	
Prespacing SCPS-2	■	■	
Premasking SCPM-44X			■
Prespacing SCPS-53X			■

8. Application

A. Adhesive

See [3M Instruction Bulletin 5.1](#) substrate preparation information and [3M Instruction Bulletin 5.5](#) for dry application techniques..

This film has an aggressive pressure-sensitive adhesive, designed to adhere to low surface energy substrates. 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 [3M Instruction Bulletin 6.5](#).

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

10. Removal

Film 3690 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.

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

- 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 (may be separated by paper), 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 Safety Data Sheets (SDS) for important health, safety and environmental information. To obtain SDS 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. Bulletin Change Summary

Black bars in margins indicate a change or addition. References to 3690LF-114 have been added. 3M Related Literature has been replaced by links to all of the recommended Bulletins throughout this Bulletin



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