3M

Scotchcal™ Graphic Film
Series 1000 and 1000LF

For Cut Graphic Decoration and Screen Printing

1. Product Description

A. Product Features

- 2-mil vinyl film
- Wide color selection
- Includes three colors with both a layflat liner and gray adhesive for excellent hiding power and a transparent film with a layflat liner
- Pressure-sensitive adhesive
- Confirms to flat surfaces, with and without rivets, moderate compound curves
- 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.

- Small format original equipment manufacturer's (OEM) decorative and identification graphics, cautionary and safety labeling
- Labels, emblems, striping on:
  - lawn and garden equipment.
  - recreational products.
  - farm equipment.
  - construction equipment.
  - appliances.

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.	7 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, vehicle surface.	5 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

- Film without graphic protection when they are:
  - printed graphics.
  - exposed to abrasive conditions, harsh cleaners or chemicals.
- Graphics applied to:
  - corrugated or highly irregular surfaces.
  - stainless steel (we recommend using 3M™ Controltac™ Graphic Film IJ181 instead).
  - surfaces that are regularly subjected to gasoline vapors or spills.

- Graphics applied to:
  - painted substrates with poor paint to substrate, or paint-to-paint bond.
  - substrate surfaces that are not clean and smooth (little or no variation in texture).
  - low surface energy materials such as polyethylene or polypropylene without flame treatment.
  - Class 1 through 8 trucks or trailers.
  - railroad rolling stock and locomotives.

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™ MCS™ 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.

See the **Warranty Information** section to determine which compatible products are approved for your graphic construction.

A. Screen Printing

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

B. 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
- Sericol™ Duracal™ Screen Print Clear*

    * See **Screen Printing** section, page 6, for how to obtain Duracal inks.

C. Other Products

- 3M™ Premasking Tape SCPM-3
- 3M™ Premasking Tape SCPM-44X
- 3M™ Prespacing Tape SCPS-2
- 3M™ Prespacing Tape SCPS-53X
- 3M™ Hand Applicator PA1-G Gold

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, opaque
Color	See Color Chart on next page
Finish	Gloss, unless otherwise noted
Thickness	**Without adhesive:** 2 mil (0.5 mm) **With adhesive:** 3 to 4 mil (0.06 to 0.09 mm)
Adhesive type and color	**1000LF-10, 1000LF-12, 1000LF-120:** Pressure-sensitive, gray **All other colors:** Pressure-sensitive, clear
Liner	**1000LF-10, 1000LF-12, 1000LF-114, 1000LF-120:** Polyethylene-coated layflat paper **All other colors:** White kraft paper
Tensile strength	5 pound/inch at 73°F (0.9 kg/cm at 23°C) *minimum*

Characteristic	Value	
Adhesion *24 hours after application*	ABS:	4 pounds/inch (0.7 kg/cm)
	Acrylic enamel:	4 pounds/inch (0.7 kg/cm)
	Aluminum, anodized:	8 pounds/inch (1.4 kg/cm)
	Chrome:	5 pounds/inch (0.9 kg/cm)
	Urethane paints:	4 pounds/inch (0.7 kg/cm)
Chemical resistance	Resists mild alkalis, mild acids, and salt Excellent resistance to water *(not including immersion)*	

B. Application Characteristics

Characteristic	Value
Finished graphic application recommendation	**Surface type:** Flat or moderate compound curves, with and without rivets **Substrate type:** Glass, metal, paint, rigid plastic **Application temperature:** 50°F (10°C) *minimum*
Applied shrinkage	0.007 inch (0.18 mm)
Temperature range after application	-65° to +225°F (-60° to +107°C)
Graphic removal	None, permanent

C. Color Chart

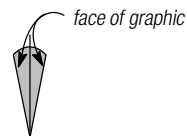| Film Color No.	Color Name	Film Color No.	Color Name
1000LF-10*†	White	1000-53	Cardinal red
1000-11	Pearl gray	1000-54	Light orange
1000LF-12*†	Black	1000-56	Dark green
1000-13	Tomato red	1000-57	Olympic blue
1000-14	Bright orange	1000-58	Burgundy
1000-15	Bright yellow	1000-63	Geranium
1000-17	Vivid blue	1000-77	Peacock blue
1000-19	Deep mahogany brown	1000-89	Sandstone
1000-22	Matte black	1000-98	Dark violet
1000-25	Sunflower	1000LF-120*†	Satin aluminum
1000-27	Indigo	1000-131	Satin gold
1000-31	Medium gray	1000-196	Apple green
1000-37	Sapphire blue	1000-197	Light navy
1000-38	Royal purple		
1000-41	Dark gray	**Transparent**	
1000-46	Kelly green		
1000-47	Intense blue	1000LF-114†	Transparent

* gray adhesive; all others have clear adhesive.
† polyethylene-coated layflat paper liner; all others have white kraft paper liner.
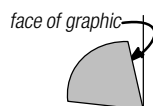
4. Definitions

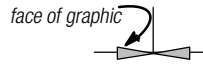### A. Exposure

U.S. Vertical Exposure

face of graphic

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

U.S. Non-vertical Exposure

face of graphic

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	*face of graphic*	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. Click here for a detailed map.

B.   Graphic Construction

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

C.   Graphic Protection

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

D.   Graphic Types

As identified in Product Warranty Matrices

OEM   Labels and decorative graphics produced for and used by original equipment manufacturers. May also be called decals.

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 Warranty 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 Warranty 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 H., below

Finished graphics constructed with the materials specified and the exposure specified in the Warranty Period tables, Section F.(1) and F.(2), are eligible for the 3M™ MCS™ Warranty. For warranties for other exposures using 3M inks and clears, see Section G.(1).

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

Graphic Protection	No Printing	Ink Series 1900	Ink Series 9800
1920DR	—	5	—
1930	—	3	—
9740i	—	5	5
9730UV	—	2	3
9800CL	—	—	5
None	5	—	—

(2) Warranty Period
Using Sericol Inks

Application: OEM graphics only
Ink and Graphic Protection: Sericol Duracal UV Screen Print Ink and Clear
Warranty: 5 years in a vertical exposure

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

These stipulations apply to the 3M™ MCS™ Warranty. General provisions for these stipulations are covered in the 3M Commercial Graphics Warranty Brochure at 3Mgraphics.com.

(1) Reduced Warranty Period for Other Graphic Exposures
3M inks and clears ONLY

For other graphic exposures, multiply the Warranty Period (in years) for your graphic construction as shown in the applicable Warranty Period tables, Section F.(1), by the percentage shown for the intended graphic exposure. See page 3 for the graphic exposure definitions.

If the Graphic Exposure is:	Use this Percentage of U.S. Vertical Exposure, Warranty Period	Examples
U.S. Non-vertical	50% (0.5)	0.5 x 5 years = 2.5 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 Outside the U.S.

Contact the 3M organization for that country.

(4) Application to Glass

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

(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. 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.
- adequate ink drying and/or UV curing.
- selection 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.

(1) Using Sericol Inks

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.

B. Cutting

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

(1) Methods

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

(2) Size of Cut Text

Weeding can be difficult with small text. The following minimum values for electronically-cut text are based on upper case, Helvetica, medium type.

Minimum letter height: 1.0 inches (25.4 mm)
Minimum stroke width: 0.19 inches (4.76 mm)
Minimum radius for a point: 0.024 inches (0.6 mm)

For the inside corners of cut-out letters and symbols, and the pointed end of stripes, cut the largest radii consistent with an acceptable appearance. This helps avoid stress cracking due to age and lifting of pointed ends during maintenance.

C. Graphic Protection

Graphic protection may improve the appearance, performance and durability of the graphic. Refer to the Product and Instruction Bulletins for more information about the clear you are using.

D. 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 and/or large letters, and/or wide stroke width.
- Use for graphics that have very little exposed liner.

(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 and/or small letters and/or narrow stroke width.

(3) How to Select a Tape

Determine whether you want to premask the graphic or prespace cut pieces of film such as letters. In the table below, locate the last coating applied to your graphic and use the corresponding tape. See Instruction Bulletin 4.3 for complete details.

EXAMPLE: If the film is protected by clear 9740i, use SCPM-44X for premasking.

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

— = The use of an application tape is not recommended in this construction.

8. Application and Installation

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.

A. Application Method

Dry or wet. However, do not use detergent and water or a commercial application liquid to position the graphic over rivets and textured surfaces.

B. Adhesive

(1) Pressure-sensitive Adhesive

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

C. Squeegee Technique

Use a 3M gold PA-1 squeegee with the appropriate sleeve/protection. For the best results, always work from the center out to the edges of the graphic to minimize trapped air. Use an air release tool to aid in removing air bubbles. See Instruction Bulletin 5.4 for details.

D. Edge Sealing

• For applications requiring edge sealing, use edge sealer 3950.

9. 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.) See Instruction Bulletin 6.5.

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

10. Removal

This film is intended to be permanent. Removal will likely damage the substrate.

If you need to try and remove a graphic, a chemical remover system is available for graphics printed with solvent-based ink. Follow the procedures for using 3M™ Controltac™ Plus Film Remover R-221 and Adhesive Remover R-231 and for additional removal details. See Instruction Bulletin 6.5 for more information.

11. 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.

12. Shelf Life, Storage and Shipping

A. Shelf Life

Total shelf life: 3 years from the date of manufacture on the original box.
If you <u>do process</u> the film, do so within 2 years and apply within 1 year.
If you <u>do not process</u> 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.

13. 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

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
- 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
- 4-color	IB	3.21
3M™ Screen Print UV Gloss Clear 9740i and Low Gloss Clear 9730UV	PB-IB	UV Clears
Design of graphics	IB	2.1
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, general procedures for indoor and outdoor dry applications	IB	5.5
Storage, handling, maintenance, removal	IB	6.5
3M Commercial Graphics Warranty Brochure	www.3Mgraphics.com, Warranties	

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14. Bulletin Change Summary

Modified or new content is marked with a black bar in margin. Updated overall format of bulletin. Added a Performance Overview section to provide a snapshot of the product's durability. Clear 9740i is a direct replacement for 3M™ Screen Print Gloss Clear 9720UV and Gloss UV Clear 9720i. Added 1000-22 Matte Black and discontinued 1000-64 Apricot and 1000-307 Dark Aqua. Revised warranty language. The term Warranted Durability is now called Warranty Period.