Gerber High Performance Series 225 Premium Film manufactured by 3M

DESCRIPTION

Gerber High Performance Series 225 is a high performance cast vinyl film made exclusively for Gerber by 3M. Series 225 is a durable, dimensionally stable vinyl with a clear, pressure-sensitive adhesive designed to withstand a variety of severe weather and handling conditions. It is available in numerous, including opaque gloss, metallic, and Clear Enamel Receptive, in both punched and unpunched formats. Series 225 comes on a synthetic liner which won't curl or split when exposed to moisture/humidity.

Note: *15 inch Series 225 is an EDGE READY™ Material. A color chart is included at the end of This bulletin as well as a PANTONE® Simulated Color Reference Table.*

PRODUCT LINE

Property	Description
Film	2-mil cast vinyl
Thickness (film and adhesive)	2.5 to 3.5 mil (0.063 to 0.09 mm)
Film color	Over 25 colors

Property	Description
Adhesive	Clear, pressure sensitive
Liner	Transparent synthetic
Application substrates	For flat surfaces with and without rivets, or simple curved surfaces
Application surfaces	Flexible signage, glass, metal, acrylic, polycarbonates, fiberglass, painted surfaces
Removability	Permanent

INTENDED APPLICATIONS

Series 225 is suitable for a wide range of commercial and industrial applications including vehicles, exterior and interior signage, window markings, display graphics, etc. It can be used on flat surfaces with and without rivets or simple curved surfaces. Series 225 has a clear adhesive and is therefore suitable for use as a cut vinyl in window/transparent substrate applications, as well as opaque applications.

PERFORMANCE LIFE (UNPRINTED)

The exterior performance life of Gerber High Performance Series 225 is based upon field experience and exposure tests conducted throughout the United States. When the graphics are processed and used according to Gerber recommendations, they will an expected performance life up to the values shown in the charts below. The actual performance depends on the following conditions:

♦ Selection and preparation of substrate

♦ Application methods

♦ Exposure conditions

♦ Cleaning methods

Application Specifics			Performance Life (years): Unprinted	
			U.S. [1,4]	S. W. [2,4]
*Vertical Exposure	**Signs Only** Solid colors, except metallic colors and clear	Unprinted, applied to first surface	7	5
		Unprinted, applied to second surface	7	5
	Vehicles Only Solid colors, except metallic colors and clear	Unprinted, applied to first surface	8	5
		Unprinted, applied to second surface	8	5
	Signs and Vehicles Metallic colors and Clear	Unprinted, applied to first surface	5	3
		Unprinted, applied to second surface	5	3

GERBER
TECHNOLOGY

Application Specifics			Performance Life (years): Unprinted	
			U.S. [1, 4]	S. W. [2, 4]
Non-Vertical Exposure[3]	**Solid Colors**	Unprinted, applied to first surface	5	Not advised

[*] Face of graphic is vertical 90° ± 10°.

[**] Face of graphic is greater than 10° from vertical.

1. For exterior performance life statements outside of the United States, contact Gerber Technology.

2. The United States Desert Southwest area includes Arizona, New Mexico, and the desert areas of California, Nevada, Utah, and Texas. A detailed map is available upon request.

3. Non-vertical applications can be used to identify commercial vehicles from the air. Non-vertical applications expose the film to the maximum effect from sunlight and the environment. There are foil and film restrictions for horizontal applications. The film may change color, lose gloss, and chalk. The following performance statements assume that only legibility is required.

4. Unprinted film 225-20 (Matte White) may chalk with age. This is considered normal and acceptable wear.

SHELF LIFE AND STORAGE

Apply film within one year of receipt. Printed graphics should also be applied within one year. Film and printed graphics (with or without premask) should be kept in a clean area free from excessive moisture and direct sunlight. Maintain temperature at less than 100°F (38°C).

Use a paper interleaf between layers of stacked or rolled printed materials. Do not stack printed graphics face to face.

PRINTING

Use Gerber HP Series 225 settings when printing with the GERBER EDGE®, GERBER EDGE 2®, or Gerber EDGE FX™.

GerberColor Finishing (GCF), GerberColor Spot (GCS), GerberColor Process Pro™ CMYK (GCP), GerberColor Medal (GCM), GerberColor Transparent (GCT), and GerberColor Special Effects (GCX) Series Foils, and ColorSet™ Foils can be used to print onto Series 225 High Performance Films.

Gerber standard tack application tape is required to be used as the transfer carrier for all printed graphics.

Recommended working environment is as follows:

- Operating temperature: 50°F to 95°F / 10°C to 35°C

- Recommended temperature for assured printing accuracy: 68°F to 78°F / 20°C to 26°C

- Operating humidity: 20% to 90% relative humidity, non-condensing (maximum range; actual range varies by material used)

PROTECTING GRAPHICS

Gerber Technology offers products that are designed to protect vinyl and printed graphics.

Gerber Guard™ manufactured by 3M is a durable, dimensionally stable, glossy vinyl overlaminate. This film has a petrochemical-resistant construction and is intended to be used when markings may be exposed to petrochemical spillage and/or severe handling conditions.

Gerber UVGuard™ is a custom-formulated, 1-mil, clear, extremely durable polyvinyl fluoride (PVF) laminating film designed to further expand the resistance to weathering of printed graphics for up to five years.

Gerber UVGuard™ 9 manufactured by 3M is a 2-mil, glossy, clear, mildew-resistant, polyvinyl fluoride laminating film with a petrochemical-resistant adhesive system. It is designed to further expand the resistance to weathering of printed graphics up to nine years. Gerber UVGuard 9 has the highest protection from UV fade.

Gerber StrikeGuard™ is an 8.0-mil, clear, glossy overlaminate film designed for a variety of applications. This heavy-duty overlaminate film is ideal for the protection of graphics, up to two years, and is especially beneficial where printed graphics experience severe handling and forceful impact. Gerber StrikeGuard is not recommended in applications that require petrochemical protection or where additional UV or vandal resistance is desired.

Abrasion Guard™ SPF (Sign Protection Formula) is a clear, top-coat GerberColor Finishing Series (GCF) Foil designed for use with EDGE® Series thermal transfer printing systems, to protect graphics from moderate contact and exposure to harmful effects of UV rays. It has an expected performance life of up to five years (when printed by itself). When applied as a protective overprint on other GerberColor Foils, Abrasion Guard SPF will extend the life of the base color by up to 30%.

CUTTING

Series 225 can be cut on any Gerber 15-inch sprocketed plotter, plus FasTrack™ or ODYSSEY™ plotter. A 30° SuperSharp blade is recommended for tangential plotters (HS15™, HS15 Plus, GSX™, GS15™, GS750™, HS750™, SMIVB™). A 45° blade should be used with swivel knife plotters (FasTrack, EmbossTrack™, enVision™, and ODYSSEY). Plotters can be set to full speed.

The minimum recommended cutting height for text is .375 inch. This recommendation is based upon evaluations using upper case Helvetica Medium copy. Users should verify their own ideal cut heights based upon their specific cutting equipment. The user should perform a test cut to determine the ideal tool force setting.

Excess film should be weeded within 24 hours of cutting to minimize the effect of adhesive flow.

SUBSTRATE PREPARATION

Before applying your graphic, wash the surface of your substrate with warm water and detergent. Do not use soaps or other cleaners with lotions or creams as they will leave a residue. Thoroughly rinse the surface and allow it to completely dry.

Saturate a clean paper towel with a solvent-based cleaner and wipe the substrate surface. Be certain to follow all manufacturer safety guidelines when using any solvent. Dry the surface with a lint-free paper towel before the solvent evaporates.

If applying to glass, wipe the surface with a 2 to 1 mixture of water and isopropyl alcohol. Glass temperatures can vary across the surface. These temperature variations can produce stresses which may cause the glass to break. Use caution when applying to glass.

Some polycarbonate substrates may weaken when certain vinyl films are applied to them. Because of this possibility, the user will need to determine if safety items such as helmets, safety shields, and some windshields are compatible with their vinyl's adhesive.

Many paint systems (e.g. two-part urethane) and some plastic substrates will outgas if they are not fully cured. Outgassing can cause permanent bubbling in most films; substrates should be

GERBER
TECHNOLOGY

tested for outgassing prior to final application. Plastics should be dried at 150ºF (66ºC) for 24 hours prior to application to help avoid outgassing.

APPLICATION TECHNIQUES

Both wet and dry application methods can be used with Series 225 and panels should be overlapped. Gerber standard tack application tape is recommended for all EDGE-printed applications (see "Printing" section for important information on applying EDGE-printed graphics.)

MAINTENANCE

To clean printed graphics, use a mild, non-abrasive soap with a soft cloth or sponge. Avoid using alcohol-based cleansers or soaps containing grit or abrasives. Automated vehicle washing systems that use rotary cleaning brushes should also be avoided.

PHYSICAL PROPERTIES

Property	English Units	Metric Units
Dimensional Stability	0.008 in	0.2 mm
Service temperature range	-40º to 225ºF	-40º to 107ºC
Tensile Strength	5 lb/in at 73ºF	0.9 kg/cm at 23ºC
Reverse impact resistance	No cracking at 73ºF or 40ºF	No cracking at 23ºC or 4ºC
Minimum Application Temperature	40ºF	4ºC

ADHESIVE CHARACTERISTICS*

Material	English Units - lb/in	Metric Units - kg/cm
Acrylic	4	0.7
Alodine aluminum	8	1.4
Fruehauf prepainted panels	4	0.7
Polycarbonate	4	0.7
Urethane paints	4	0.7

(24 hours after application)

GERBER
TECHNOLOGY

CHEMICAL RESISTANCE

Chemical Agent	Exposure Time	Result
Reference fuel	1 hour	edge softening
#1 diesel fuel	1 hour	edge softening
10% Hydrochloric acid	10 minutes	no effect
10% Ammonium Hydroxide	10 minutes	no effect
Mild acids	10 minutes	no effect
Salts	10 minutes	no effect
Water	10 minutes	no effect
Alkalis	10 minutes	no effect

FLAMMABILITY

Series 225-10 (white) has been tested for flame spread per ASTM E84-95, "Surface Burning Characteristics of Building Materials," and meets the requirements of National Fire Protection Association Class A (1) (most fire-resistant class) as defined in NFPA 101, "Life Safety Code."

RELATED LITERATURE

Refer to Product Bulletins of relevant foils and materials for product-specific handling, production, and finishing information.

CONTACT INFORMATION

For help with questions concerning Gerber products, please call your distributor or Gerber Customer Service at 1-800-222-7446 or (860) 644-1551. Visit us on the Internet at www.gerbertechnology.com/signage to learn more about our many other foils, materials and equipment.

GERBER HP SERIES 225 COLOR CHART

Solid Colors

225-10 White	225-12 Black	225-13 Tomato Red
225-15 Bright Yellow	225-17 Vivid Blue	225-19 Deep Mahogany Brown
225-20 Matte White	225-22 Matte Black	225-25 Sunflower
225-31 Medium Grey	225-37 Sapphire Blue	225-38 Royal Purple
225-47 Intense Blue	225-49 Beige	225-53 Cardinal Red
225-56 Dark Green	225-57 Olympic Blue	225-58 Burgundy
225-63 Geranium	225-66 Forest Green	225-186 Bright Green
225-197 Light Navy		

Metallic Colors

225-120 Silver
225-131 Gold

Clear

225-114 Clear Enamel Receptive

PANTONE® Simulated Color Reference Table		
PANTONE **Simulated Color**	**Gerber HP Series 225** **Color Name**	**GSP** **Pigment Code**
Process Black C	BLACK	225-12
348C	BRIGHT GREEN	225-186
109C	BRIGHT YELLOW	225-15
4625C	DEEP MAHOGANY BROWN	225-19
3302C	FOREST GREEN	225-66
872C	GOLD - Metallic	225-131
301C	INTENSE BLUE	225-47
289C	LIGHT NAVY	225-197

GERBER TECHNOLOGY

PANTONE Simulated Color	Gerber HP Series 225 Color Name	GSP Pigment Code
Black C	MATTE BLACK	225-22
422C	MEDIUM GREY	225-31
7461C	OLYMPIC BLUE	225-57
877C	SILVER - Metallic	225-120
1235C	SUNFLOWER	225-25
1795C	TOMATO RED	225-13

Category: EDGE READY™   **FastFact #**: 5573   **Supplied by**: Aftermarkets   **Last Modified**: 02/27/18

GERBER TECHNOLOGY

Scotchcal™ Graphic Film
Series 3650

For Solvent and UV Screen Printing Only

1. Product Description

A. Product Features

- 2-mil opaque film
- Available in white, black and transparent
- Pressure-sensitive adhesive
- Resists gasoline vapors and occasional petroleum spills
- 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.

- Clear, window or 2-way graphics
- Outdoor and indoor graphics and signs
- Information labels
- Commercial fleet vehicle graphics and emblems
- Small format original equipment manufacturer's 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 (opaque) 8 years (transparent) 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

- Graphics applied to corrugated surfaces
- Graphics applied to stainless steel vehicles
- Fleet or vehicle graphics without graphic protection
- Any graphic without graphic protection that is exposed to abrasive conditions, harsh cleaners or chemicals

Note: 3M Commercial Graphics Division policy is not to support applications of clear graphic film when a driver's view is obstructed and/or where local laws prohibit its use.

(2) Light Passage Laws and Regulations

⚠ **CAUTION**

Some states have laws or regulations requiring minimum light passage that may limit or preclude the use of this product on vehicle windows. The user is responsible for determining and complying with all applicable standards.

(3) Important Information About Bus Applications

Film used on buses must not be applied so as to restrict the safe use of emergency window exits. See the most current version of [Instruction Bulletin 5.4](#) for details.

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.

(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
- 3M™ Screen Printing Clear VIO402

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

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

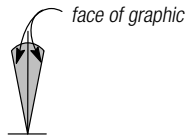| Characteristic	Value
Material	Vinyl
Color	3650-10: White 3650-12: Black 3650-114: Clear
Thickness	**Without adhesive:** 2 mils (0.05 mm) **With adhesive:** 3 to 4 mils (0.08 to 0.10 mm)
Adhesive type	Pressure sensitive
Adhesive color	3650-10: Gray-pigmented 3650-12: Clear 3650-114: Clear
Liner	Polyethylene-coated layflat
Tensile strength *(minimum)*	5.5 pounds/inch at 73°F (0.9 kg/cm at 23°C)
Flammability	ASTM E84 test report or go to the On-line Product Catalog at 3Mgraphics.com All other test reports: call 1-800-328-3908
Safety and regulatory recognition	Tested and found to comply with UL 969 - Standard for Marking and Labeling Systems. US file MH11410.

B. Application Characteristics

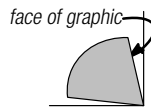| Characteristic	Value
Adhesion *24 hours after application*	**ABS:** 5 pounds/inch (0.9 kg/cm) **Acrylic, enamel:** 5 pounds/inch (0.9 kg/cm) **Aluminum, anodized:** 6 pounds/inch (01.1 kg/cm) **Chrome:** 5 pounds/inch (0.9 kg/cm) **Fruehauf pre-painted panels:** 4 pounds/inch (0.7 kg/cm)
Chemical resistance	Resists mild acids, mild alkalis, and salts. Excellent resistance to water *(this does not include immersion)*
Finished graphic application recommendation	**Surface type:** Flat, with and without rivets **Substrate type:** Glass, metal, paint, fiberglass reinforced plastic, rigid plastic **Application temperature:** 50° to 100°F (10° to 38° C) *air and substrate* **Application method:** Fleet & Vehicles: dry All others: wet or dry
Applied film shrinkage	0.015 inch (0.4 mm)
Finished graphic exposure temperature	-65° to +160°F (-54° to +70°C)
Graphic removal	Permanent film

4. Definitions

A. Exposure Types

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. 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.

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   Overlaminate 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 D., 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 I.(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
OEM = Small format OEM labels and graphics
Signs = Indoor and Outdoor Sign Graphics

Warranty Period, in Years

Graphic Protection	No Printing			Ink Series 1900			Ink Series 9800			Ink Series 9800 Metallic		
	Veh	OEM	Signs	Veh	OEM	Signs	Veh	OEM	Signs	Veh	OEM	Signs
Films 3650-10, 3650-12												
1920DR	—	—	—	5	5	5	—	—	—	—	—	—
1930	—	—	—	2	2	2	—	—	—	—	—	—
V10402	—	—	—	6	5	6	—	—	—	—	—	—
9740i	—	—	—	6	5	6	7	5	7	7	5	7
9730UV	—	—	—	3	3	3	3	3	3	—	—	—
9800CL	—	—	—	—	—	—	5	5	5	5	5	5
None:				—	—	—				—	—	—
3650-10	8	5	7	—	—	—	—	—	2	—	—	—
3650-12	7	5	7	—	—	—	—	—	2	—	—	—
Film 3650-114												
1920DR	—	—	—	5	5	5	—	—	—	—	—	—
1930	—	—	—	2	3	3	—	—	—	—	—	—
V10402	—	—	—	5	5	5	—	—	—	—	—	—
9740i	—	—	—	5	5	5	5	5	5	5	5	5
9730UV	—	—	—	3	3	3	3	3	3	—	—	—
9800CL	—	—	—	—	—	—	5	5	5	5	5	5
None	5	5	5	—	—	—	—	—	—	—	—	—

G. 3M™ MCS™ Warranty Using Sericol Inks

Application: OEM graphics only
Film: 3650-10, 3650-12, 3650-114
Ink and Graphic Protection: Sericol Duracal UV Screen Print Ink and Clear
Warranty Period: 3 years in a vertical exposure

H. Legibility Warranty

For Fleet Graphics ONLY for Horizontal, Exposure and Selected Constructions

Applications subjected to maximum sunlight and environmental conditions used on rooftops of commercially-owned fleet vehicles where identification from the air is needed are warranted for <u>legibility only</u> for the following constructions. The graphic will change color, lose gloss and chalk.

Warranty Period, in Years

Films 3650-10, 3650-12		Horizontal Exposure	
Ink Series	Clear	U.S.	U.S. Desert Southwest
No printing	None	5	3
9800	9740i 9800CL	5	3

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

These stipulations apply to the 3M™ MCS™ Warranty. Also see the Graphics Market Center Warranty Brochure.

(1) Reduced Warranty Period for Other Graphic Exposures

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 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	Warranted for legibility only. See Section 5.H. 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) Gasoline Vapor and Occasional Spills

For the best protection against staining for screen printed graphics subjected to gasoline vapors or occasional spills, use ink series 1900 with clear V10402.

(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) Application Outside the U.S.

Contact the 3M organization for that country.

(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 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.

- The liner on film series 3650 is not printable. If you need a printable liner, contact Technical Service at 800-328-3908.
- Graphic protection can improve the appearance, performance and durability of your graphic. A clear coat also prevents chalking on unprinted colored films. Use standard screen printing methods to apply clear coats.

B. Cutting

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

(1) Methods

- Bandsawing
- Hot kiss cutting
- Drum-type electronic cutting
- Flat-bed electronic cutting
- Guillotine
- Hand cut
- Cold and hot steel-rule die cutting
- Knifeless™ Tape

(2) Size of Cut Text

The following minimum values for cutting text from film series 3650 are based on upper case Helvetica medium type. Weeding is much more difficult with smaller text.

Minimum stroke width: 0.25 inch (6.35 mm)
Minimum height: 3.0 inch (76.2 mm)
Minimum radius for end of stripe: 0.024 inch (0.6 mm)

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 wet or 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.

B. Edge Sealing

If an application requires edge sealing, use edge sealer 3950.

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

Film series 3650 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 80°F (4° to 27°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 Material Safety Data Sheets (MSDS) for important health, safety and environmental inform-ation. 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

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 VIO402 - Screen printing with ink series 1900 - line color - Screen printing with ink series 1900 - 4-color	PB IB IB	1900 3.12 3.11
3M™ Screen Printing UV Ink Series 9800 - Screen printing with UV ink series 9800 - line color - Screen printing with UV ink series 9800 4-color	PB IB IB	9800 3.20 3.21
3M™ Screen Print UV Gloss Clear 9740i	PB-IB	UV Clears
Preparation for four color screen printing	IB	1.1
Design of graphics	IB	2.1
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
Storage, handling, maintenance, removal	IB	6.5
3M Commercial Graphics Warranty Brochure		

3M, MCS and Scotchcal are trademarks of 3M.
Sericol and Duracal are trademarks of FUJIFILM Corporation.
Knifeless is a trademark of Knifeless Technology Systems.

14. Bulletin Change Summary

Corrected adhesive color to clear for black film 3650-12. Clear 9740i is a direct replacement for clears 9720i and 9720UV. Added flammability information on ASTM E84. This product complies with UL 969 - Standard for Marking and Labeling Systems. Added Knifeless tape as a recommended cutting method. Updated overall bulletin format including adding new Performance Overview section and revising the Warranty Information section. Warranted Durability is now referred to as Warranty Period.

3M