



Screen Printing

With 3M™ Screen Printing UV Ink Series 9800

For Line Color Screen Printing Only

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2. Recommended Types of Graphics and End Uses

UV ink series 9800 is a high performance, ultraviolet-curable ink formulated for use on any 3M brand graphic film designed for screen printing. This Bulletin covers how to use line color ink UV series 9800. Refer to the most current Product Bulletin 9800 for detailed information on applications, limitations and warranties.

3. Compatible Products

A. Graphic Films

Refer to the Product Bulletin for the base film being used for ink compatibility, intended applications, construction options and warranties.

B. Clears

- 3M™ Screen Printing UV Gloss Clear 9800CL
- 3M™ Screen Printing UV Gloss Clear 9740i
- 3M™ Screen Printing Low Gloss Clear 9730UV

C. Application Tapes

- 3M™ Premasking Tape SCPM-44X
- 3M™ Prespacing Tape SCPS-53X
- 3M™ Prespacing Tape SCPS-55

4. Product Line

All information in this Product Bulletin is subject to change. Be sure this is the most current Product Bulletin. See the 3M Related Literature section for a list of all Bulletins you may need in order to use this product properly.

Continued on the next page

Opaque Colors		Transparent Colors		Clears										
9802	Opaque Black	9825	Blue Shade Red	9800CL Gloss										
9803	Mixing Black	9828	Yellow Shade Red											
9806	Mixing White	9831	Orange											
9808	Opaque White	9840	Medium Yellow											
9812	Magenta	9848	Yellow											
9813	Red Violet	9864	Blue Shade Green											
9826	Brick Red	9882	Red Shade Blue											
9827	Red													
9830	Orange													
9837	Red Shade Yellow													
9843	Medium Yellow													
9849	Lemon Yellow													
9861	Light Green													
9879	Green Shade Blue													
9891	Blue Violet													
		Note: Custom blended colors are available. Contact a 3M Commercial Graphics sales representative or customer service representative for more information.		<table border="1"> <thead> <tr> <th colspan="2">Other Products</th> </tr> </thead> <tbody> <tr> <td>9800B</td> <td>Halftone Base</td> </tr> <tr> <td>9800HBB</td> <td>Heavy Body Halftone Base</td> </tr> <tr> <td>9801</td> <td>Thinner</td> </tr> <tr> <td>9810</td> <td>Toner</td> </tr> </tbody> </table>	Other Products		9800B	Halftone Base	9800HBB	Heavy Body Halftone Base	9801	Thinner	9810	Toner
Other Products														
9800B	Halftone Base													
9800HBB	Heavy Body Halftone Base													
9801	Thinner													
9810	Toner													

5. 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.



WARNING

Observe safe operating procedures when using ink series 9800. Provide adequate ventilation and wear appropriate gloves and other protective clothing to avoid all skin contact. Refer to the Material Safety Data Sheet (MSDS) for details.

A. Air Quality Regulations

State Volatile Organic Compound (VOC) regulations may prohibit the use of certain cleaning chemicals with VOC's in graphic arts coatings and printing operations. For example, the California South Coast Air Quality Management District prohibits use of certain solvent-based solutions without a permit and other California AQMD's prohibit use of certain solutions without a permit or a regulatory exemption. Check with your State environmental authorities to determine whether use of this solution may be restricted or prohibited.

6. Sheet Preparation

A. Conditioning

A change in humidity or temperature can affect the moisture content of the liner during storage and/or printing. These changes can affect the liner's size and lay-flat characteristics, as well as graphics that have tight tolerances or multiple colors.

For the best results, heed the following guidelines.

(1) All Liners

- Use films with polyethylene-coated liners.
- Keep the sheets of film wrapped in polyethylene.
- Do not condition the sheets of film by running them through the UV cure unit.
- Complete the printing as quickly as possible.
- Avoid stacking the sheets of film in an uncontrolled environment. The stacked sheets absorb moisture unevenly and develop wavy edges.

(2) Kraft Paper Liner Only

- Stabilize the sheets of film under the normal humidity and temperature conditions of the shop.
- Condition the sheets of film overnight by racking them individually, or placing two sheets face-to-face.

B. Cutting

The sheet size and the direction the sheet is cut from the roll can affect the liner stability due to humidity and temperature variations.

For the best results, follow these guidelines:

- Print a fewer number of graphics on a smaller sheet size instead of printing more graphics on a larger sheet.
- If possible, cut all sheets in the same direction and put the critical length parallel to the roll edge.

C. 3M™ Scotchlite™ Reflective Graphic Film

Close color matching of multi-sheet graphics is difficult on retroreflective materials because production lots may vary. Adjoining panels of reflective graphic films must be checked for both daytime and night time appearance.

Follow the recommendations in [Instruction Bulletin 2.1](#) to minimize within-lot and crossweb variation. Reflective films 680CM-10 and 680CRCM-10 are available already color matched.

D. Liner Printing

(1) Liners that Cannot Be Printed

The liners on most Scotchcal, Scotchlite and Controltac brand films are polyethylene-coated paper, which cannot be printed.

(2) Liners that Can Be Printed

Kraft paper liners, on some 3M films, can be printed. Print the liner before screen printing the graphic.

(1) Methods for Printing Liners

The graphic manufacturer is responsible for testing and approving any printing on the liner. Follow the ink manufacturers' processing instructions.

- **Screen printing:** use a fast drying screen printing ink for paper. Rack the sheets individually until they are dry at least 30 minutes.
- **Printing on a press:** use a fast-drying, process black ink. Stack the sheets.

Note: Make sure the ink used on the liner does not transfer to the film or ink series 9800 later during processing. Slip sheets may be necessary.

7. Ink and Clear Preparation

A. Coverage

Typically, one U.S. gallon (3.8 liter) of ink series 9800 covers 2500 to 3500 square feet (59 to 83 square meter/liter).

However, several elements affect the coverage:

- Screen mesh and type
- Hardness (durometer) of the squeegee
- Angle of the squeegee
- Emulsion thickness

B. Mixing

- Return any ink adhered to the lid to its container.
- Thoroughly mix the ink before formulating colors or printing. This ensures an even distribution of the ink components.
- Use a high-speed power mixer with a blade that is 1/3 to 1/2 the diameter of the container. Put the blade 2/3 of the way into the liquid. Make sure to move it around in the entire container.

C. Clear Preparation

Clear 9800CL is press ready. Do not dilute with toner, thinner or base.

(1) Color Matching with Clear 9740i

With critical color matches of light colors, take into consideration that clear 9740i has a yellow tint when cured in a focused-lamp cure unit. See [Product & Instruction Bulletin UV Clears](#) for more information about yellow tints.

(2) Tinting and Toning

- Use ink 9806 to tint colors.
- Do not use ink 9808 to tint colors; this ink is a block-out color only.
- Use less than 95% by weight of ink 9806. Using more may affect the durability of the color.
- Use only toner 9810 to tone colors.
- Do not tone or thin the clear.
- Use less than 50% by weight of any combination of thinner 9801, toner 9810 and half-tone base 9800B. Using more may affect the durability of the color.

(3) Reducing the Viscosity

- Thin the inks with thinner 9801.
- Use less than 10% by weight of thinner 9801.
- Do not add toner 9810 to the clear; this will reduce the clear's durability and gloss.
- Test the formulation for printability.

(4) Increasing the Viscosity

- Use halftone base 9800B to thicken the ink. This may be necessary for printing fine lines, copy, or a halftone pattern.
- To increase the viscosity by 500 centipoise, add about 1 to 5% by weight of halftone base 9800B to the ink.
- Do not add more than 50% by weight of halftone base 9800B to an ink formula.
- Do not add halftone base 9800B to the clear; this will reduce the clear's durability and gloss.
- Test the formulation for printability.

(5) Foaming

Foaming may occur when the print rate is greater than 1000 to 1500 impressions per hour. Foaming creates entrapped air bubbles that give a poor flow-out appearance. Add less than 10% by weight of thinner 9801 to reduce foaming.

(6) About Using Ink Series 9800 on Scotchlite Reflective Graphic Film

- Ink series 9800 is compatible with reflective graphic films. However, not all of the inks are transparent. Using a formulation containing an opaque ink prevents the film from properly retroreflecting in the printed area. White and black are opaque colors.
- Print the ink formulation and view it under night time conditions to determine if the retro-reflectivity is adequate.
- To maximize the night time retroreflectivity, you may need to add toner to full strength blends of transparent inks.

8. Printing

A. Frame

- Use a rigid, metal frame. Include a 6 to 10 inch (15 to 25 cm) well between the frame and the graphic design on all sides.
- Use a screen tension of 137 pounds force/foot (20 newtons/cm) or higher.

B. Fabric

- Use a polyester, monofilament, plain weave fabric.
- Use a thread count of PE355 to PE390 (140 to 150 tpc).
- Use a thread with a diameter of 31 to 34 microns.
- The thickness of the clear will be 10 to 15 microns depending on the fabric used.

Note: Calendared fabrics, twill weaves and thick threads affect the ink lay down and cause printing and curing problems.

C. Stencil

Use direct emulsions and thin capillary films that yield a thin ink deposit and are water soluble, resistant to ketones and strong lacquer solvents, and are compatible with UV inks.

D. Squeegee

Multiple durometer squeegees (70/90, 65/95/65, 70/90/70, or 75/95/75) provide the best results. A sharp squeegee with an 80 durometer or harder plastic blade also will work. A softer squeegee increases the ink lay down and can make printing more difficult.

The squeegee should be large enough to overlap the design by at least 2 inches (5 cm) on each side.

The squeegee angle should be set at a position as near to vertical as possible. The angle should not be less than 80 degrees. The exact angle may vary because of press design. A lower angle may result in a heavy ink lay down. This may cause printing and curing problems.

E. Printing Method

1. Remove any dust or particles from the fabric, the stencil and the sheets by using a tack rag (a varnish- impregnated cloth). Make sure the cleaning cloth itself does not leave contaminates on the surface. Cleanliness and control of dust are important to getting good results.
2. Position the film on the press bed and hold the film in place with a vacuum.
3. Use the off-contact screen printing method to produce a uniform impression pass. Make a fill pass and then make the impression pass.
4. Cure the ink within 5 minutes of screen printing. Delaying the curing process may cause an undesirable surface appearance.
5. Perform all of the tests as outlined in the Testing section.

F. Screen Cleaning

Use a commercially-available screen cleaner. You also can use a blend of solvents such as xylol and methyl ethyl ketone. Screens that are not thoroughly clean may adversely affect the print quality when the screen is reused.

Non-solvent screen washes must be tested. They can cause the ink to gel in the screen or the reclaimed ink may contaminate unused ink.

9. Curing

A. Radiometer

The UV energy output of the cure unit must be accurately measured. Use an Uvicure™ Plus UVA/High Power model. This radiometer is available from: EIT Corporation, 108 Carpenter Drive, Sterling, VA 20164, Phone: 703-478-0700.

Calibrate your radiometer on a regular basis to ensure its readings are accurate.

Note: Other radiometers may not give the same readings.

B. Focused-lamp Cure Unit

Focused-lamp cure units use high concentrations of ultraviolet light to initiate polymerization. Ink series 9800 is formulated to cure when exposed to a focused, medium-pressure, mercury-vapor lamp at a belt speed necessary to achieve the required energy output. Ink series 9800 can be partially cured by stray light in and around a printing facility, such as skylights, windows and overhead lights.

Use bulbs that produce light with wavelengths of 260 to 360 nanometers. Ozone-free and doped bulbs may not produce the correct wavelengths to properly cure ink series 9800. Some quartz IR filters can also interfere with the curing of the ink.

Check to make sure that the energy levels are uniform across the entire web. When testing this uniformity, do not use belt speeds greater than 45 ft/min (14 m/min). Energy levels could be significantly lower at the web edges. Do not print graphics that are wider than the width of the uniform output of the bulbs.

(1) Cure Unit Operation

1. Measure the UV energy levels at the beginning of every working day and whenever adjustments are made to the unit.
2. Allow the lamps to heat-up for at least 10 minutes or until the indicators show that the lamps have stabilized.
3. Replace bulbs according to the bulb manufacturer's recommendations. Dirty lamps and reflectors or bent reflectors prevent the ink from curing properly.
4. Adjust the lamp wattage and/or belt speed to get the specified energy level on the radiometer.

Products	UV Energy millijoules/cm ² (mJ/cm ²)	UV Peak milliwatts/cm ² (mW/cm ²)
Colors	200 to 275	600
Clear 9800CL	250 to 325	600

Note: Radiometer measures in joules/cm². To convert, 0.045 joules/cm² = 45 mJ/cm².

5. Test the ink to make sure that it is properly cured. Test methods are outlined in the Testing section.
6. Adjust the unit until the ink is correctly cured.

10. Testing

Maintain a test log for future reference. Each print pass must be tested to determine if the ink or the screen print clear is properly cured. Every print pass must pass these 3 tests.

- Appearance Test
- Abrasion Resistance Test
- Tape Snap Adhesion Test

A. Appearance Test

This test determines if the ink visually appears to be cured.

(1) Frequency

Test before printing each color and applying the clear.

(2) Surface Characteristics

Properly cured ink series 9800 should have these surface characteristics:

- Medium to high gloss for the inks; high gloss for clear
- Smooth ink surface
- No wet or overly tacky areas

B. Abrasion Resistance Test

This test determines if the ink is undercured.

(1) Frequency

Test in several areas on the sheet before printing each color and applying the screen print clear.

(2) Procedure

1. Make press adjustments to produce an acceptable wet (uncured) print.
2. Print a production sheet of film and pass it through the UV curing unit.
3. Try to smear the ink by twisting your thumb on the surface of the graphic. Be sure to wear protective gloves to protect your skin from any uncured ink and prevent your skin oil from influencing the outcome.

If impressions are made on the ink surface:
 - a. Check to make sure the press conditions follow the recommendations.
 - b. Reduce the ink thickness.
 - c. Use a harder squeegee.
 - d. Set the squeegee angle closer to vertical.
 - e. Increase the energy level by slowing the belt speed slightly.
4. Repeat steps 2 and 3 until the ink passes.

C. Tape Snap Adhesion Test

This test determines the cure of:

- Each color and trap on the film if a clear will not be applied
- Clear over each ink color
- Clear over bare film
- Clear over color traps

Passing the sheet through the curing unit several times may change the surface characteristics of the ink and the film. Testing simulates the process and allows you to adjust the process and prevent graphic failures.

(1) Frequency

Test in several areas on the sheet before printing each color and before applying the clear.

(2) Procedure

a. At the beginning of the print run

1. Print and cure the first color.
2. Pass the sheet through the cure unit for the same number of times as there are colors left to print plus 2 more times. For example, if one color remains, pass the sheet 3 times through the unit.
3. Offset the sheet and then, reprint the ink so that it prints over the previously printed color and on the bare film.
4. Cure the graphic with 4 passes at the ink energy level to simulate the clear.
5. Test the ink using steps 6 through 10.

b. At the beginning of each color or clear pass

6. Use the point of sharp razor blade, a knife, or other suitable instrument to scratch a crosshatch pattern through the ink. Do not cut into the film. Be sure to scratch areas where the coating is over each printed ink layer and the film.
7. Use 3M™ Hand Applicator PA1-G Gold to firmly apply 1 inch wide Scotch™ Tape #610 over the crosshatched areas.

Note: Applicator PA1-G is available from 3M Commercial Graphics. Tape 610 is available through most film or tape distributors.

8. Remove the tape by pulling it back upon itself using a rapid, firm pull.
9. No separation should occur between the inks or between the inks and the film.
10. If the ink separates, decrease the energy level by increasing the belt speed slightly and retest.

Note: The ink must still pass the Abrasion Resistance Test and Appearance Test after making any adjustments.

11. Special Applications

A. Use of Continuous Multi-Station Presses

A multi-station press automatically moves a sheet from one press and cure unit to another. Because sheets cannot easily be removed from between the presses, performing the standard tests is difficult or impossible.

If the printing will be finished after one pass through the equipment, perform the Abrasion Resistance Test and the Tape Snap Adhesion Test (page 6) at the end of the pass. Test the sheet on the left, right, top and bottom edges, plus several places in the middle. Test all of these combinations of ink colors, clear and film:

- Clear over each ink color
- Clear over bare film
- Clear over color traps
- Each color over each film combination if a clear will not be applied

If more than one pass through the multi-station press is required to process the sheets, call Technical Service for guidance.

B. Roller Coating

Although our UV clear coats are designed for screen printing, they can be roll coated. The process must produce the 3M recommended coating thickness of 6-12 microns in all areas of the graphic, with a gloss and an appearance that is acceptable to the end user. Achieving the correct thickness is critical. If the coating is too thin, it will not have the expected durability; if too thick, the coating will reduce the film's ability to stretch and conform.

3M UV clears are high viscosity solutions that require appropriate handling equipment, and may require adjustments to flow properly. Do not thin the clear coat or add any components (such as flow agents) that have not been approved by 3M.

3M does not recommend or endorse a specific roll coater, nor does 3M make specific recommendations on how to make 3M UV clears more suitable for roll coating.

C. Metallic and Pearlescent Inks

Producing graphics with ink that contains metallic and pearlescent flakes requires careful attention to produce consistent, high quality graphics. Even small changes in components and processing conditions affect the print quality.

(1) Warranted Metallic Flakes

The recommended aluminum flakes are a "non-leafing" type and are dispersed in mineral oil. Their disk shape provides a specular-like appearance and has a "whiter" look than other flakes that have a cornflake-like shape.

Do not use larger flakes, which are difficult to screen print and may not produce graphics with a consistent appearance.

Use only the recommended flakes. Other flakes may not be outdoor durable.

Specifically request COATED flakes as both coated and uncoated flakes have the same part number. The aluminum in metallic flakes can catalyze UV-cured inks, causing the ink to thicken rapidly, affect color consistency and reduce pot life.

Flake Size	Sparkle Silvex™ Aluminum Flakes
Small	SSP-950-20-C
Medium	SSP-910-20-C or SSP-404AR

Flake Size	Nazdar® Metallic Flakes
Fine	SIPM 573
Medium	SIPM 606
Coarse	SIPM 571

Note: Sparkle Silvex is available from: Silberline Manufacturing Company, Inc., 130 Lincoln Drive, P.O. Box B, Tamaqua, PA 18252-0420 Telephone: 800-348-4824

Note: Nazdar® Aluminum Flakes are available from: Nazdar Inks & Coatings, 8501 Hedge Lane Terrace, Shawnee, KS 66227 Telephone: 800-677-4657

(2) Flake Deterioration Issues

IMPORTANT NOTE!

Metallic flakes require special handling. Exposure to air causes them to deteriorate and clump together, or agglomerate. This will cause printing problems. We recommend buying only what can be used in a short period of time.

To ensure good, consistent print quality, special handling of the flakes is required. The recommended flakes have an unopened shelf life of one year from date of manufacture. However, each time you open the container, the flakes are exposed to oxygen and moisture, which degrades the flakes and shortens the shelf life. As the flakes oxidize, they agglomerate. Agglomerated flakes appear darker, have less hiding power and have less specularity than non-agglomerated flakes. The screens used in the printing process tend to filter out the agglomerations. These factors result in reduced ink lay down and a change in flake concentration, causing color changes throughout the print run.

(3) How to Determine if Flakes are Deteriorating

1. Upon receipt of the flakes, prepare a known concentration: 5% or 10% of flakes in toner 9810.
2. Print this mixture on a clear substrate such as 3M™ Controltac™ Graphic Film 180-114. Apply this to a piece of glass. This is your standard.
3. Each time you use flakes from the same container (in the same concentration), compare the standard to the new prints. Look for a change in hiding power and color consistency. It is up to the operator to determine an acceptable quality level.

(4) How to Protect the Flakes

Limiting exposure of the flakes to air and moisture is the best defense against deterioration. This is what you can do to protect the flakes:

1. Order a smaller container of flakes.
2. Repackage the flakes into quantities you typically use for one print run. Use packaging similar to the original packaging containers.
3. Tightly reseal the container immediately after removing the flakes.
4. Store at temperatures between 50° and 80°F (10° to 27°C).
5. Avoid high shear mixing which can also cause the flakes to agglomerate.

Note: The ink must still pass the Abrasion Resistance Test and Appearance Test after making any adjustment.

(5) Warranted Pearlescent Flakes

Pearlescent flakes are a stable, multi-layer, metal oxide. Compared to aluminum flakes, the pearlescent flakes have a subtle specularity and they do not muddy the color of ink series 9800. Although there is some sparkle to pearlescent flakes, it is usually only seen in sunlight.

Pearlescent flakes come in a variety of colors from white pearl to red, violet, bronze, yellow, blue or green. Colored inks are used with the pearlescent flakes to get the color. Not all colors of flakes have good outdoor durability.

Do not use large flakes, which are difficult to screen print and may not produce graphics with a consistent appearance.

Use only the following pearlescent flakes.

Flake Size	EMD Chemicals Part No.	Effect
Small	9111 WR Rutile Fine Satin	Luster
	9121 WR Rutile Luster Satin	Luster
Medium	9103 WR Sterling Silver	Similar to small to medium aluminum flake, except they have no opacity or hiding power

Note: These pearlescent flakes are available from: EMD Chemicals, Inc., Performance Materials Division, One International Plaza, Suite 300, Philadelphia, PA 19113, Telephone: 888-367-3275

(6) Mixing

1. Follow these concentration recommendations.

Type	Maximum Concentration by % weight	Typical Concentration by % weight
Metallic flakes	15	5 to 10
Pearlescent flakes	15	10 to 15
Mixtures of metallic and pearlescent flakes	15	5 to 10

2. Use a power mixer. Do not use a cowls blade dissolver or any other high shear mixer. These can cause the flakes to break or agglomerate.
3. Gradually add the flakes to the liquid and mix until the flakes are evenly blended.
4. Inks must be mixed frequently to keep the flakes from settling.
 - Increasing the flake concentration increases the viscosity. To decrease the viscosity, add less than 10% by weight of thinner 9801.
 - Adding 5 to 10% by weight of halftone base 9800B gives the ink body and slows the rate that the flakes settle. Reducing the settling helps maintain more consistent color throughout the print run.

- If there is any colored ink in the formula, limit the combined amount of thinner 9801 and toner 9810 to 80% by weight.
- If there is no colored ink in the formula, there is no limitation for the amount of thinner 9801 and toner 9810.
- Adding more than 10% to 15% by weight of opaque ink prevents the ink from curing correctly. There is a trade-off between the amount of flake and the amount of opaque ink that allows the formulation to cure properly.
- Using opaque inks increases the opacity, but decreases the specularly of the ink and the perception of depth.

(7) Printing

- Use the same screen printing method for metallic and pearlescent ink as regular ink series 9800.
- Mesh size is critical. Too small an opening does not allow all the flakes to go through causing the color to shift. Too large a mesh opening does put down too thick an ink deposit and interfere with cure. The theoretical ink volume should be less than 0.48 inches cubed/square yard (13.5 cm³/m²).
- Follow these mesh size recommendations.

Type	Flake Size	Median Flake Size <i>microns</i>	Mesh Size
Sparkle Silvex Metallic flake	Small	19	34 micron or larger 355 to 390 plain weave
	Medium	22	34 micron or larger 305 plain weave
Nazdar Metallic flake	Fine	na	Recommended meshes for printing metallics are 305 to 355 (120 – 140 cm) plain weave monofilament polyester
	Medium	na	
	Coarse	na	
EMD Chemicals Pearlescent flake	Small	< 20	34 micron or larger 355 to 390 plain weave
	Medium	10 to 40	34 micron or larger 305 plain weave

- Inks must be mixed frequently to keep the flakes from settling.
- The ink must be mixed before adding it to the screen and then thoroughly mixed with the ink already in the screen.
- Both types of flakes increase the wear on the squeegee and the screen mesh.

(8) Curing

- Curing metallic inks from ink series 9800 may be more difficult if flake concentrations are greater than 15% by weight. To cure properly, the inks may need a higher energy level than the recommended 140 mJ/cm² target. When using higher energy, the Tape Snap Adhesion Test is even more critical.
- Cured ink is initially softer and tackier than ink without flakes. Gradually increase the energy level until the ink does not easily scrape off of the film. The ink hardens in about 2 hours.
- Increasing the flake concentration more than 12% to 15% by weight increases the softness of the ink.

(9) Pot Life

- After adding the metallic flakes, the pot life of metallic ink is 1 to 2 days after which time the ink begins to gel. How fast the inks gel depends on the flake concentration, the storage temperature, the formula and the mixing conditions.
- Pearlescent flakes do not cause the ink to gel. However, the flakes do settle more rapidly than metallic flakes.

(10) Testing

- The appearance will not be as glossy because of the surface texture.
- The initial softness of the inks may cause the ink to be more easily scraped off during the Abrasion Resistance Test. page 6.
- The clear option must be used for the Tape Snap Adhesion Test, page 6.
- Ink formulations that have a high flake concentration may split within the ink layer during the Tape Snap Adhesion Test, page 6. If this happens, reduce the flake concentration.

12. Shelf Life, Storage and Shipping

A. Shelf Life

- Use by the expiration date shown on the product packaging. A Use By Date, such as 01Jan2014, is on the ink container product label, as well as the outer shipping carton.
- Do not use ink that shows signs of gelling.

B. Storage Conditions

- 60° to 90°F (15°to 32°C)
- Away from direct sunlight, mercury vapor lamps, quartz-halogen lamps, or arc lamps.
- Store in original container or in other sealed, black polyethylene containers. *Do not store the inks in glass or metal containers.*

C. Shipping Finished Graphics

Refer to the base film's Product Bulletin.

- Cure ink and clear coat before packaging.
- Put a slip sheet, such as 3M™ Easy Release Liner #33, on the printed side(s) of graphics that are:
 - pre-mounted to panels
 - printed on the liner

13. Warranty and Limited Remedy

The information contained and techniques described herein are believed to be reliable, but 3M makes no warranties, express or implied, including but not limited to any implied warranty of merchantability or fitness for a particular purpose.

The [3M Commercial Graphics Warranty Brochure](#) at 3Mgraphics.com, along with the applicable film Product Bulletins, provide the details to any warranty offered for the 3M graphics products described in this bulletin.

14. Limitation of Liability

Except where prohibited by law, 3M SHALL NOT UNDER ANY CIRCUMSTANCES BE LIABLE TO PURCHASER OR USER FOR ANY DIRECT, 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.

15. 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 techniques described in these Bulletins are required when applying a 3M warranted graphic, but are also practical recommendations when using promotional materials for non-warranted graphics. 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 Print UV Gloss Clear 9740i	PB-IB	UV Clears
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 Commercial Graphics Warranty Brochure	Go to www.3Mgraphics.com/Warranties	
Sample Color Deck for Ink Series 9800	75-5100-2446-8	
<i>Contact your 3M sales representative to order.</i>		

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16. Bulletin Change Summary

New and modified content is marked with a black bar in the margin. Clear 9740i is a direct replacement for 3M™ Screen Print Gloss Clear 9720UV and 3M™ Screen Print UV Gloss Clear 9720i. Corrected the instructions on adjusting the energy level for the Tape Snap Adhesion Test if the ink separates from the film. Updated contact information for EMD Chemicals.



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