

Ink Series 2900

Quick Links

- [3M Graphics Warranties](#)
- [Technical Information Selector](#)
- [Safety Data Sheets \(SDS\)](#)
- [Videos](#)

Some of these links lead to web-based resources that are not product-specific.

Product Description

- Line Color Inks for Screen Printing Only
- Formulated for use on selected 3M™ Scotchlite™ Reflective Graphic Films

Product Features

- High performance, fast drying ink system
- Weather resistant, with excellent color retention
- Superior exterior performance on difficult application surfaces, including corrugated and riveted surfaces
- Lead-free materials are available

i IMPORTANT NOTE

Pigments in Ink Series 2900 may be slightly different from those in other 3M screen printing inks. Adjustments may be needed.

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.

- For graphics used in a petroleum environment where staining is not a concern
- For graphics applied to flat or corrugated surfaces, with and without rivets
- Railcars

Product Line

Line Color Transparent Ink

2905	Black opaque (not transparent)	2914	Yellow
2906	Orange	2915	Cyan
2908	Green	2916	Blue Violet
2910	Blue	2917	Brown
2912	Red	2922	Lemon Yellow
2913	Maroon	2923	Magenta

Clears

1920DR	Dirt Resistant Clear
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Toner/Reducer

2907	Toner
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3M™ Thinners

For Inks or Clears	For Inks Only
CGS-30	CGS-80
CGS-50	

Note: The higher the CGS number, the slower the evaporation rate.

Recommended Compatible Products

Always refer to the most current Product Bulletin at www.3Mgraphics.com/TechInfo for the 3M films you are using for complete details, including ink compatibility and specific recommendations.

Graphic Materials

Ink series 2900 is compatible with most of 3M's reflective graphic films that are designed for screen printing.

Graphic Protection

- [.3M™ Screen Print Gloss Clear 1920DR](#)
- [3M™ Screen Print UV Gloss Clear 9740i](#)

Application Tapes

See [3M Instruction Bulletin AT-1](#) to determine what application tape is recommend for your film or finished graphic.

Warranty Information

Warranty Coverage Overview

The warranty coverage for eligible graphics is based on the user both reading and following all applicable and current 3M Graphics Product and Instruction Bulletins. The warranty period for eligible graphics is as stated in the 3M Graphics Warranties Matrices at the time that the film was purchased. Information found at 3Mgraphics.com/warranties includes:

- [3M Graphics Warranties Bulletin](#)
 - This bulletin contains information on limitations and exceptions, and warranty period reductions for 3M Graphics Warranties. The warranty period may be reduced and stipulations may apply for certain constructions and applications, as covered in this Bulletin.
- [3M Graphics Warranties Selector](#)
 - Use this selector to search for your warranty period by product number, ink type, and ink/printer platform.
- [U.S. Desert Southwest Region Map](#)
 - Use this map of hot, arid desert areas to determine if you are subject to reduced warranted durabilities.

The warranties set forth in this Bulletin are made in lieu of all other express or implied warranties, including any implied warranty of merchantability, fitness for a particular purpose, or arising out of a course of dealing, custom, or usage of trade.

3M Basic Product Warranty

3M Graphics Products are warranted to be free of defects in materials and manufacture at the time of shipment and to meet the specifications stated in its applicable 3M Graphics Product Bulletin and as further set forth in the [3M Graphics Warranties Bulletin](#).

Limited Remedy

The limited remedy applicable to each warranty is addressed in the 3M Graphics Warranties Bulletin found at 3MGraphics.com/warranties.

Limitation of Liability

Except to the extent prohibited by law, 3M SHALL NOT UNDER ANY CIRCUMSTANCES BE LIABLE TO PURCHASER OR USER FOR ANY DIRECT (EXCEPT FOR THE LIMITED REMEDY PROVIDED HEREIN), 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 3M'S GRAPHICS 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.

Warranty Period Matrices

See the 3M Graphics Warranties Matrices at 3MGraphics.com/warranties, for warranty period information specific to your film.

Additional Limitations

Graphics Exposed to Abrasion or Staining

Graphics are not warranted against fading, cracking, peeling, lifting or discoloration due to severe abrasion or staining from cleaning solutions, engine fuels, exhaust, or organic solvents.

Color Matching Ink to Film

If the color of a printed ink is matched to the color of a pigmented film, the finished ink and film may not maintain the same color or gloss after being exposed outdoors.

See the 3M Graphics Warranties Bulletin at 3MGraphics.com/warranties, for terms, additional limitations of your warranty, if any, information on reduced warranties for different exposures, and limitations of liability.

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/SDS, 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.

Ventilation

Provide local and/or general exhaust ventilation in the print production areas to prevent a build up of ink vapors and to maintain levels below the limit for worker exposure. An experienced industrial ventilation engineer and/or a certified industrial hygienist can help evaluate your ventilation requirements and design based on your onsite process conditions.

Please refer to the printer manufacturer's literature for additional details and requirements.

Air Quality Regulations

State Volatile Organic Compound (VOC) regulations may prohibit the use of certain 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 regulatory exemption. Check with your State environmental authorities to determine whether use of this solution may be restricted or prohibited.

More on Environmental Health and Safety

Additional environmental, health, and safety information is available on our website at 3Mgraphics.com/sustainability.

Graphic Performance Life

The actual performance life of a graphic is affected by all of the following. Additional performance considerations may be provided in the base film Product Bulletin.

- A clear is required for graphics printed with ink series 2900.
- Custom formulations containing 3M screen printing ink series 1900 with Scotchlite ink series 2900 void the warranty.
- If the color of a printed ink is matched to the color of a pigmented film, the finished ink and film may not maintain the same color or gloss after being exposed outdoors.

Special Considerations for Reflective Film

- Reflective film will not properly retroreflect in the printed area if you use an opaque ink or a formulation containing opaque ink.
- It is difficult to closely match colors of multi-sheet graphics on retroreflective materials. This is because production lots may vary. Always check adjoining panels of reflective films for both daytime and nighttime appearance.
- Follow the recommendations in [3M Instruction Bulletin 2.1](#) to minimize within-lot and cross-web variation. Reflective films 680CR-10 and 680-10 are available already color matched.

Application Tapes

After the graphics are thoroughly dry, you should apply a prespace tape or premask tape using a roll applicator. Do not use heat.

There are two types of application tapes. See [3M Instruction Bulletin AT-1](#) to determine what application tape is recommend for your film or finished graphic.

Premasking Tape

Increases stiffness during application while preventing stretching and damage. Use when little or no liner is exposed. See [3M Instruction Bulletin 4.3](#) for complete details.

Prespacing Tape

Holds cut and weeded letters or graphics in place during application and after removing the film liner, while preventing stretching and damage. Use when large amounts of liner are exposed. See [3M Instruction Bulletin 4.3](#) for complete details.

Sheet Preparation

Liner Printing

- Polyethylene-coated paper liner; this type of liner cannot be printed.

Sheet Conditioning

You may need to condition the sheets of film before using them for a job that has tight tolerances or multiple colors. A change in the humidity or the temperature can affect the moisture content of the liner during storage and/or printing. These changes can affect registration and lay-flat characteristics.

For the best results, follow these guidelines:

All Liners

- Keep the sheets of film wrapped in polyethylene.
- Complete the printing as quickly as possible.
- Avoid stacking the sheets of film in an uncontrolled environment. The stacked sheets absorb moisture unevenly and may develop wavy edges.

Sheet Cutting

The sheet size and the direction the sheet is cut from the roll can affect the liner stability 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

Pre-Drying Sheets

Some screen printers find it helpful to run the unprinted sheets through the conveyor dryer once immediately before printing.

Ink and Screen Print Clear Preparation and Coverage

Ink series 2900 and clear 1920DR must be reduced to reach desired viscosity.

Ink series 2900, under typical conditions with inks thinned to press-ready viscosity and using a 230 tpi (threads per inch) mesh screen, covers approximately 1200 to 1600 square feet (30 to 45 square meters) with one gallon (3.8 liters) properly thinned.

Clear 1920DR under typical conditions and using a 200 tpi mesh screen, covers approximately 2500 square feet (61.4 square meters) with one gallon (3.8 liters), properly thinned.

Many factors affect the ink coverage, including:

- Screen mesh and type.
- Amount of thinner.
- Hardness (durometer) of the squeegee.
- Angle of the squeegee.

Mixing, Toning, and Thinning Ink Series 2900

- Mix the ink for 10 minutes before formulating the colors for printing. This ensures an even distribution of all ink components.
- If you add components to adjust the density or printability, mix for an additional 5 minutes.
- Use a high-speed power mixer with a blade 1/3 to 1/2 the diameter of the container. If the blade is smaller than this, move it around in the container. Put the blade 2/3 of the way into the liquid.
- A paint shaker also can be used. Shake for 15 to 20 minutes.

Toning

- Use a maximum of 50% by weight of toner 2907 to tone colors.
- Do not use any clear ink to tone colors.
- Never add toner to a clear ink.

Thinning, Reducing Viscosity (Required)

Inks must be thinned to a viscosity of 1500 to 2000 cps, using thinner CGS-30, CGS-50 or CGS-80. The higher the number, the slower the evaporation rate. Thinning may require using 20 to 30% by weight of thinner. Test the formulation for good printing.

Mixing and Thinning Clear 1920DR (Required)

IMPORTANT NOTE

Always thoroughly mix the components as described in the section "Mixing, Toning, and Thinning Ink Series 2900" on page 5.

Clear must be thinned. A viscosity of 600 to 900 centipoise (approximately 30 seconds in a #5 Zahn cup) is recommended. It is recommended to thin the clear:

- Use thinner CGS-30 or CGS-50.
- Start by adding one part thinner to 5 parts clear by volume.
- For roller coating, use no more than 30% thinner by weight.

To Obtain Stated Durability for Printed and Cleared Film

The thickness of clear 1920DR after drying must be a minimum of 0.00024 inches (0.006 mm) on the printed areas. Usually this thickness can be obtained only when using one of the following methods:

- Screening the clear through a screen of 200 tpi or coarser.
- Roll coating, thinning the clear no more than 30% by weight.

It is assumed that sufficient clear has been applied if shop documents verify the clear usage (discounting waste) of at least one gallon the clear, unthinned, for approximately 2500 square feet coated (3.8 liter per 61.4 square meters).

Screen Printing

The printing order of the colors is not critical but should be the same as the order used in proofing.

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.
- The recommended screen tension is 20 newtons/cm or higher.

Fabric

Tightly and uniformly stretch a monofilament thread, twill or plain weave fabric on the frame. Using a plain weave or calendared fabric may result in reduced color intensity and opacity. A 230 tpi (90 t/cm) screen is recommended for ink series 2900.

Stencil

Use a photographic or hand-cut stencil that is water soluble and resistant to ketones and strong lacquer solvents.

Squeegee

Use a sharp squeegee with a medium to hard, rubber or plastic blade. The squeegee should be large enough to overlap the design by at least 2 inches (5 cm) on each side.

Printing Method

1. Remove any dust or particles from the fabric, the stencil and the film sheets by using a tack rag (a vanish-impregnated cloth). Cleanliness and controlling dust are important to getting good results.
2. Position the film on the press bed.
3. Hold the film in place with a vacuum.
4. Use the off-contact screen printing method to produce a uniform impression. Make a fill pass and then make the impression pass.

Drying

Conveyor drying is recommended. Refer to [3M Instruction Bulletin 3.12](#) for details.

These are guidelines for properly drying graphics. Time and temperature will vary with equipment, amount and type of thinner, ambient temperature, humidity and air flow.

It is essential that sufficient residual thinner be removed from the graphic before the premask tape is applied. If there is any question as to sufficient dryness, a dryness test should be performed.

Conveyor drying is recommended. Check the conveyor temperature at various locations across the belt.

Drying Method	Minimum Temperature	Minimum Time
Air	Ambient	24 hours
Batch	150 °F (64 °C)	10 minutes
Conveyor	150 °F (64 °C)	30 seconds

Dryness Test

To ensure dryness, test the graphics as follows:

1. This test is designed to set the dryer conditions and approximate dryness.
 - a. Touch a printed sheet, face-to-face.
 - b. Place the touched area close to your ear and separate the film.
 - c. If the graphic is adequately dried, there will be either a slight sound or no discernible sound when the surfaces are separated. If the graphics are not dried, there will be a crackling sound. The louder the sound, the greater the amount of additional drying that is required.
2. This test is designed to definitely determine if adequate drying has occurred.
 - a. Place several printed, dried sheets, face-to-face, under a 12 inch (30 cm) stack of film. A weight of 2 pounds/square inch (135 gm/square cm) can be used in place of the film stack.
 - b. After 10 minutes, remove the sheets and check for blocking or surface impressions.
 - c. If the blocking or severe surface impressions are noted, additional drying is required. The temperature may be increased or the conveyor speed may be reduced.

Registration

Maintaining good registration is critical to good visual color balance. The single most important factor affecting the ability to maintain registration is drying temperature. It is important to the entire process that drying temperatures be only as high as is absolutely necessary.

Screen and Equipment Cleaning

Use a commercially-available lacquer thinner, thinners CGS-50 or CGS-80, or a blend of solvents such as xylol, methyl ethyl ketone and/or methyl isobutyl ketone, and VM&P naphtha. Less aggressive solvents may not clean the screen thoroughly and may adversely affect the print quality of the screen when it is reused.

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

Cleaning Clear from the Screen

Use thinner CGS-30 or CGS-50 or a similar solvent.

IMPORTANT NOTE

Ink series 2900 is not compatible with some solvents commonly used for screen washing and clean-up. Test solvents before use. An incompatible solvent or thinner will produce a gummy residue, which will be very difficult to remove.

Application and Installation

In addition to other 3M Bulletins specified in this document, the following Bulletins provide details that you may need to successfully apply a graphic.

- [3M Instruction Bulletin 4.1](#). Sheeting, Scoring and Film Cutting.
- [3M Instruction Bulletin 5.1](#). Select and Prepare Substrates for Graphic Application
- [3M Instruction Bulletin 5.36](#). Application Techniques for Automobiles, Vans and Buses. Complete the 3M Pre-Installation Inspection Record found in this Instruction Bulletin prior to manufacturing or applying a graphic to an automobile, van, or bus.
- [3M Instruction Bulletin 5.4](#). Application, Fleet Trucks.
- [3M Instruction Bulletin 5.45](#). Application Techniques for Railcars.
- [3M Instruction Bulletin 6.5](#). Storage, Handling, Maintenance, and Removal of Films and Sheetings.

Shelf Life, Storage and Shipping

Shelf Life

Use by the expiration date shown on the product packaging. A Use By Date, such as 01Dec2014, is on the ink container product label, as well as the outer shipping carton. Do not use ink that shows signs of gelling.

Ink Storage Conditions

- Store the inks at 32 to 90 °F (0 to 32 °C).
- Store the inks in the original container or in other similar containers.

Shipping Finished Graphics

Refer to the base media's 3M Product Bulletin.

Shipping Ink

The inks are non-regulated when transported via ground. Opened ink boxes and bags may no longer provide adequate protection against leaks and spills. Exercise caution when shipping opened boxes or bags to ensure prevention of spills or leaks. In the United States, refer to the SDS for further information.

Bulletin Change Summary

For the most current 3M Technical Information available to successfully use this product, please view this Bulletin electronically and click on the blue underlined links to view the relevant documents. This Bulletin has been substantially changed. Please read the entire Bulletin thoroughly.

Rev D JULY-2015:

- Updated Product Bulletin to new format.

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