



Screen Printing

3M™ Scotchlite™ Screen Printing Ink Series 2900 (line colour)

Description

3M™ Scotchlite™ Transparent Screen Printing Ink Series 2900 are high performance inks formulated for use on selected 3M™ Scotchlite™ Reflective Graphic Films. When used according to 3M recommendations, these inks allow the reflective properties of the graphic films to be seen, except when using black.

Product Line

This information is subject to change. Be sure this is the most current Product Bulletin. See 3M Related Literature at the end of this bulletin.

Product	Colour
2905	Black ²
2906	Orange
2908	Green
2910	Blue
2912	Red
2913	Maroon
2914	Yellow
2915	Cyan
2916	Blue Violet
2922	Lemon Yellow
2923	Magenta
Overprint Clear	
1920DR	Dirt Resistant Overprint Clear
4430R	Petroleum Resistant Overprint Clear
9720 UV	UV Cured Overprint Clear
3M™ Thinners	
2907	Toner
3M™ Thinners	
CGS-30	
CGS-50	
CGS-80 ¹	

¹ The higher the CGS number, the slower the evaporation rate.

² Black ink is opaque, not translucent.

Compatible Products

Note: For films not listed here, check the film's Product Bulletin for compatibility with ink series 2900.

Films

3M™ Scotchlite™ Reflective Graphic Films

- Series 680 and Films 680-10CM

Other Films

Ink series 2900 can be used on other 3M vinyl films, when a transparent colour is required

Sheet Preparation

Sheet Conditioning

You may need to condition the sheets of film before using them for a job that has tight tolerances or multiple colours. 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.

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 two sheets face-to-face.

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.

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 colours 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 Instruction Bulletin 2.1 to minimize within-lot and crossweb variation.

Reflective films 680CM-10 is available already colour matched.

Ink and Overprint Clear Preparation and Coverage

Caution

Before handling any chemical products, always read the container label and the MSDS.

Inks and overprint clears from ink series 2900 must be thinned to reach the desired viscosity.

Many factors affect the ink coverage, including:

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

Line Colour Coverage

Under typical conditions with line inks thinned to press-ready viscosity and using a 90T screen mesh, the approximate coverage is 30 to 45 m² litre.

Overprint Clear Coverage

One litre of unthinned overprint clear will cover approximately 60 sqm when thinned to print viscosity, and printed through a 90T screen. Use of less than recommended usage of overprint clear can result in shortened durability.

Ink and Overprint Clear Mixing

- Mix the ink and the overprint clear for 10 minutes before formulating the colours or 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. Mix for 15 to 20 minutes.

Toning

- Use a maximum of 50% by weight of toner 2907 to tone colours.
- Do not use an overprint clear to tone colours.
- Do not tone or thin the overprint clear.

Thinning, Reducing the Viscosity

- Thin the inks with 3M™ Thinner CGS-30, CGS-50, or CGS-80. The higher the number, the slower the evaporation rate. Test the formulation for printability.
- Thin the overprint clear with CGS-30 or CGS-50 (add about one part of thinner to 5 parts of clear by volume). The recommended viscosity is 600-1000 Centipoise (approximately 30 seconds in a #5 Zahn cup).
- To reduce the viscosity of the line colour inks, add enough thinner to obtain a viscosity of 1500 to 2000 cps. This may require adding 20 to 30% by weight of thinner CGS-30, CGS-50 or CGS-80.

Screen Printing

Caution

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

Caution

Before handling any chemical products, always read the container label and the MSDS.

Frame

- Use rigid screen frames that are large enough to provide a 15 to 25 cm (6 to 10 inch) well between the frame and the open stencil area.
- 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 colour intensity and opacity

- For inks and clear, a 90T screen mesh is recommended

Stencil

- Use a photographic or hand-cut stencil that is water soluble and resistant to ketones and strong lacquer solvents.
- Prepare all stencils for a graphic before printing begins.

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 5 cm (2 inches) 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 varnish-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

Listed below are suggestions for obtaining properly dried graphics. Times and temperatures vary with equipment, amount and type of thinner or retarder, 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.

Drying Method	Minimum Temperature	Minimum Time
Air	Ambient	24 hours
Batch	65 – 70°C	10 minutes
Conveyor ¹	65 – 70°C	30 seconds

¹ Conveyor drying is recommended. Check the conveyor temperature at various locations across the belt.

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 30cm (12 inch) stack of film. A weight of 135 gm/cm² (2 pounds/square inch) 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 blocking or severe surface impressions are noted, additional drying is required. The temperature may be increased or the conveyor speed may be reduced.

Clean Up

Screen and Equipment Cleaning

Use a commercially-available lacquer thinner, thinners CGS-50, 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.

Important Note!

The inks and overprint clears from ink series 2900 are not compatible with some solvents commonly used for screen washing and clean-up. All such solvents should be tested before use. The use of incompatible thinner will produce a gummy residue, which will be very difficult to remove.

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. See the film's Product Bulletin and Instruction Bulletin 4.3 for details on selecting and using application tape.

Shelf Life, Storage and Shipping

Ink Series 2900

- Store the inks at 0° to 32°C (32° to 90°F).
- Use the ink within 1 year of purchase.
- Store the inks in the original container only.


Finished Graphic

- Be sure the ink and the overprint clear are dried before packaging the finished graphic.
- Ship the finished graphic lying flat or rolled. To roll, wrap the graphic film-side out onto a core that is 13 cm (5 inches) or larger in diameter. These methods help to prevent the film and premask from wrinkling or popping off the liner.
- Put a slip sheet, such as 3M™ Easy Release Liner SCW -33, on the printed side of the following types of graphics:
 - a graphic that is pre-mounted on panels
 - panels that have graphics on both sides
 - a liner that is printed by the printer
- Store the graphics in a clean, dry area.
- Store the graphics out of the direct sunlight and at a temperature less than 38°C (100°F).
- The combined shelf life of processed and unprocessed 3M film or film cannot exceed 2 years from the date you receive the film. However, the film or film must be used within 1 year of processing even if the combined shelf life is less than 2 years.

3M Related Literature

Subject	Bulletin No.
Product Bulletins	
3M™ Scotchlite™ Screen Printing Ink Series 2900	2900
Instruction Bulletins	
Preparation for four colour screen printing	1.1
Design of graphics	2.1
Screen printing with 4-colour ink series 1900	3.11
Scoring and cutting	4.1
Using 3M application tapes; premask and prespace for films	4.3
Storage, handling, maintenance, removal	6.5
Warranties	
Worldwide 3Mä MCS™ Warranty Packet (includes all Commercial Graphics MCS Warranties)	

Health & Safety

 Caution
Provide adequate ventilation and observe safe operating procedures when using ink series 2900. Refer to the Material Safety Data Sheets (MSDS) for details

Refer to the package label and the Material Safety Data Sheet for health, safety, and handling information on the products referenced in this bulletin. For 3M products, if necessary, you may contact our Toxicology/Product Responsibility Department on 01344 858000.

Important Notice to Purchaser

The 3M products described in this publication are covered by a 3M warranty and limitation of liability.

3M's warranty provides that if 3M finds that goods are defective in material or workmanship they will be replaced or the price refunded at 3M's option but note that 3M does not accept liability for other direct losses (except for personal injury or death) or consequential losses relating to defective products or from information supplied by 3M.

Purchasers and users of 3M products, and not 3M supplying companies, are always solely responsible for deciding on the suitability of the 3M product for their required or intended use.

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For help on specific questions relating to 3M Commercial Graphics Division Products, contact your local Technical Service Representative.

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