Series 680 and Series 680CR with Comply™ Adhesive

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

- For screen printing
- 7-mil, flexible, enclosed lens, retroreflective, engineer-grade films offering flexibility and versatility

Product Features

- Available in 11 colors, including black (black film reflects white)
- Designed for excellent cutting and weeding with computer sign cutting equipment
- Unprocessed film resists fuel vapors and occasional spills
- Similar daytime and nighttime appearances
- Retains most of its reflectivity when wet
- Excellent angularity
- Pressure-activated adhesive for easy sliding and tacking
- For flat, curved, or corrugated surfaces with and without rivets
- Expected performance life of nine years for vehicles and seven years for rail applications (unwarranted periods for unprinted film with no graphic protection, applied to a flat, vertical, outdoor surfaces)

Recommended Types of Graphics and End Uses

- Commercial straight trucks, semi-trucks, and semi-trailers
- Buses, vans, passenger vehicles, delivery and pickup trucks, and enclosed trailers
- Rail and lead cars of trains
- Non-regulated, indoor and outdoor signage, emblems, and striping
- Indoor and outdoor graphics and signs
- Small format original equipment manufacturer's (OEM) decorative and identification graphics and cautionary and safety labeling

When constructed and used as described in this bulletin, these types of graphics and end uses may be warranted by the 3M™ MCS™ Warranty. Read the entire bulletin for details.

IMPORTANT NOTE

This film is NOT recommended for use on stainless steel or chrome substrates. Contact your sales representative for information about more appropriate products.

IMPORTANT NOTE

This film is not recommended on low surface energy (LSE) substrates such as some plastics, powder-coated paint, etc. The user must assume responsibility for testing and approving these substrates. Contact your sales representative for information about more appropriate products such as ZC0105.

CAUTION

Some substrates such as under-cured polyurethane paint, fiberglass, and some paint systems may continue to outgas for some time. Two-part polyurethane paints and screen print clears may stop curing when the air and surface temperature are lower than 75°F (24°C).

Recommended Compatible Products

See 3M.com/graphicswarranties for a complete list of compatible products approved by 3M for use with the base film covered in this bulletin and for the creation of graphics that may be eligible for the 3M™ MCS™ Warranty.

Screen Printing Inks for 3M™ MCS™ Warranty

- 3M™ Screen Printing Ink Series 1900 (Solvent), line color and four color
- 3M™ Scotchlite™ Screen Printing Ink Series 2900 (Solvent)
- 3M™ Screen Printing UV Ink Series 9800, line color and four color

Graphic Protection

- 3M™ Gloss Wrap Overlaminate 8418G
- 3M™ Scotchcal™ Gloss Overlaminate 8518
- 3M™ Scotchcal™ Luster Overlaminate 8519
- 3M™ Scotchcal™ Gloss Overlaminate 8528
- 3M™ Envision™ Gloss Wrap Overlaminate 8548G
- 3M™ Envision™ Luster Wrap Overlaminate 8549L
- 3M™ Screen Print Gloss Clear 1920DR
- 3M™ Screen Print UV Gloss Clear 9740i
- 3M™ Screen Print UV Gloss Clear 9800CL

Other Products

- 3M™ Edge Sealer 3950

Certificate of 3M™ MCS™ Warranty

Graphic manufacturers who produce digitally printed graphics made with all 3M Graphics Products, including 3M Ink purchased through a qualified 3M Distributor or 3M Printing Partner, may register to be recognized with a Certificate of 3M™ MCS™ Warranty. Only graphic manufacturers having a current Certificate of 3M™ MCS™ Warranty are eligible to extend this warranty to their customers.

NOTE: For non-digitally printed Finished Graphics, check your eligibility for the 3M™ MCS™ Warranty by viewing the Warranty Period found within the Product Bulletin or using the warranty selector at www.3m.com/graphicswarranties.

Characteristics

These are the typical values for unprocessed product. Processing may change the values.

Physical Characteristics

Characteristic	Value		
Material	Vinyl		
Thickness	**With adhesive:** 7–8 mil (0.18–0.20 mm)		
Film Color	**Film Number (680 and 680CR):**	**Color Name:**	**Typical Coefficient of Retroreflection:** (At -4° entrance angle and 0.2° observation angle)
	-10	White	100
	-14	Orange	20
	-64	Gold	70
	-71	Yellow	65
	-72	Red	20
	-75	Blue	10
	-76	Light Blue	10
	-77	Green	20
	-81	Lemon Yellow	75
	-82	Ruby Red	15
	-85	Black	30
Retroreflection Definition	The typical coefficient of retroreflection defined is measured at a -4° entrance angle and a 0.2° observation angle. It is expressed in candlepower per foot-candle per square foot (candela/lux/square meter) per ASTM E810. The entrance angle is formed by a light beam striking the surface at a point and a line that is perpendicular to the surface at the same point. An observation angle is formed by the light beam striking the reflective surface and returning to the observer. From 800 feet (249 meters), a motorist normally views a graphic at a 0.2° angle.		
Adhesive	**IJ680-10:** Pressure-activated (slideable) **IJ680CR-10:** Pressure-activated (slideable) with air release channels		
Adhesive Color	Clear, with silver underneath		
Liner	Polyethylene-coated paper		
Typical Adhesion at Room Temperature 24 Hours After Application (90 Degree Peel Angle)	680: • **Aluminum:** 3-4 lbs/in. (0.5-0.7 kg/cm) • **Painted aluminum panels:** 2-3 lbs/in. (0.4-0.5 kg/cm) • **Vinyl film (8519):** 2.5-3.5 lbs (0.5-0.6 kg/cm) 680CR: • **Aluminum:** 2-3 lbs/in. (0.4-0.5 kg/cm) • **Painted aluminum panels:** 1-2 lbs/in. (0.2-0.4 kg/cm) • **Vinyl film (8519):** 2-3 lbs/in. (0.4-0.5 kg/cm)		
Safety Standards	See "Health and Safety" on page 6 for ASTM, NFPA®, and AAR information		
Chemical Resistance	Resists mild alkalis, mild acids, and salt. Excellent resistance to water (does not include immersion) Resists occasional fuel spills.		
Flammability	Call 1-800-328-3908 for information.		

Application Characteristics

Characteristic	Value
Finished Graphic Application Recommendation	**Surface type:** Flat, with and without rivets, moderate curves, and corrugations **Substrate type:** Aluminum, fiberglass reinforced plywood (FRP), paint **Application method:** Dry **Application temperature (air and substrate):** • **Flat without rivets:** 50°F to 100°F (10°C to 38 °C) • **Flat with rivets:** 55°F to 100 °F (13°C to 38°C) • **Curved, or corrugated surfaces with or without rivets:** 55°F to 100 °F (13°C to 38°C) • Watch for condensation if the substrate is cooler than air.
Temperature Range After Application	-30°F to +200°F (-34°C to +93°C) (Though not for extended periods of time at the extremes.)
Graphic Removal	**680:** Not removable. **680CR:** Removable with heat and/or chemicals from most substrates within the specified warranty period.

Factors Affecting Graphic Performance Life

The actual performance life of a graphic is affected by:

- The combination of graphic materials used
- 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 and maintenance methods

Graphics Manufacturing

⚠ CAUTION

Before using any equipment, always read the manufacturer's instructions for safe operation.

Screen Printing

Formulations and processing conditions can affect ink durability. Users should refer to their ink's product and instruction bulletins for limitations and proper usage.

- Ink Series 1900 and some colors in Ink Series 9800 are opaque. Be aware that opaque ink can prevent the film from retroreflecting in screen printed areas. Ink Series 2900 is a good choice when retroreflection is important in screen printed areas.
- For graphics subjected to fuel vapors or occasional spills, use screen printing Ink Series 2900 and Clear 1920DR.
- Oven dry the last color and the clear when using solvent-based inks on graphics for any corrugated application.

ⓘ IMPORTANT NOTE

Be sure to check the consistency of color on reflective film as it may appear different in daytime and nighttime lighting.

Completely Dry Graphics

ⓘ IMPORTANT NOTE

Incomplete drying or curing can result in graphic failure including curling, increased shrinkage, and adhesion failure, which are not covered under any 3M Graphics warranty.

See the ink's 3M product and instruction bulletins for more details.

Cutting

See 3M Instruction Bulletin 4.1 for Sheeting, Scoring and Film Cutting details.

Graphic Protection

Graphic protection may improve the appearance, performance, and durability of the graphic. Click on the graphic protection options listed in this product bulletin or see the 3M Graphics Materials Product Catalog for more information.

IMPORTANT NOTE

During installation, scratches may occur on films without graphic protection.

Application Tapes

There are two types of application tapes. See 3M Instruction Bulletin AT-1 to determine what application tape is recommended for your film or finished graphic.

Premasking Tape

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

Prespacing tape holds cut and weeded letters or graphics in place during application and after removal of 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.

IMPORTANT NOTE

Do not attempt to exchange the liner. This will compromise the film's slideability, and could negatively impact the applied graphic's adhesion or appearance, which are not covered by any 3M warranty.

Application and Installation

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

- 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 5.36 prior to manufacturing or applying a graphic to an automobile, van, or bus.
- 3M Instruction Bulletin 5.4 Application: Fleet Trucks.
- 3M Instruction Bulletin 5.5 Application, General Procedures for Interior and Exterior Dry Application

IMPORTANT NOTE

UV inkjet inks may crack if too much heat is used when applying graphics to complex curves and deep contours as well as around rivets. When using heat during an application, ensure the film surface temperature does not exceed 212°F (100°C). For best results, **always do a test application** of a printed graphic to determine how much heat can be used without damaging the image.

IMPORTANT NOTE

3M recommends using a heat gun to post-heat the applied film for all vehicle graphics. After applying the film and removing the application tape, post-heat all film edges and cut letters to a film surface temperature of 130°F to 150°F (54°C to 66°C) and then re-squeegee. This should ensure adequate adhesion and minimize the risk for edge lifting. Film applied in deep channels and recessed areas should be post-heated to a film surface temperature of 200°F to 225°F (93°F to 107°C) to reduce the risk for lifting in those areas. Ensure the film is adhered to the substrate before using the heat gun or you may shrink or burn through the unsecured film.

IMPORTANT NOTE

This film can be applied over other recommended 3M graphic systems. Graphics printed with clear 1920DR must be weathered for at least one year before applying this film over it. See 3M Instruction Bulletin 5.1 for details.

IMPORTANT NOTE

Do NOT assume different run numbers will provide a uniform nighttime appearance when placed side-by-side. When producing multi-panel jobs, use film from the same roll (or at least the same run number). Apply adjacent panels with the film running in the same direction. If applying panels side-by-side, to overcome side-to-side variability within a roll, rotate every other panel by 180° in the RIP layout so the edges of adjacent panels meet from the same side of the roll. See Figure 1. Notice that the matching edges are always swung to meet each other. For example, the right side of panel 1 and the left side of panel 2 should come from the right side of the roll. (For more information, see section 4 of 3M Instruction Bulletin 4.1.)

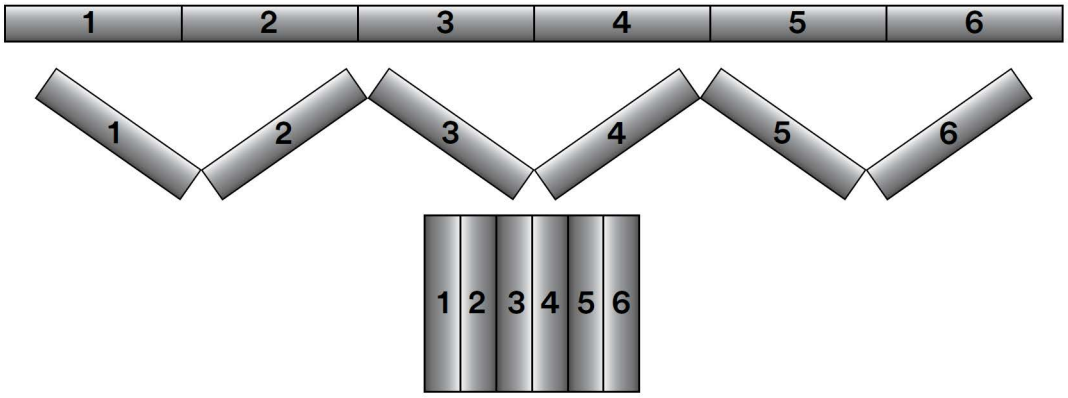

Figure 1. RIP Layout

Pressure-activated Adhesive

The pressure activated adhesive on this film offers:

- smooth sliding into position on a substrate;
- fast finger tacking to check positioning; and
- easy repositioning when you need it.

The **reposition feature is lost:**

- when firm pressure with a squeegee or other application tool is applied;
- at application temperatures above 100°F (38°C) even if only light finger pressure was used for tacking;
- if any part of the film is removed from the original liner and reapplied to the same or another liner; or
- if solvent from inkjet ink has not completely dried or cured, also affecting slideability.

CAUTION

Snapping up graphics can damage the film's reflective layer. This will be visually apparent during nighttime viewing even if the graphic appears undamaged during daylight hours.

Working with Air-Release Channels

The air release channels on the 680CR films are a characteristic of all films with Comply™ adhesive, allowing trapped air to exit through the edges of the graphic. The channels will be damaged and effective air removal affected if you remove and attempt to change liners or reapply the same liner.

For the best results, always work from the center out to the edges of the graphic. Use an air release tool to help remove any trapped air bubbles. See 3M Instruction Bulletin 5.4 for details.

Maintenance and Cleaning

Use a cleaner designed for high-quality painted surfaces. The cleaner must be wet, non-abrasive, without solvents, and have a pH value between 3 and 11 (neither strongly acidic nor strongly alkaline). See 3M Instruction Bulletin 6.5 for details.

Removal

680 film is not removable. 680CR film is removable with heat and/or chemicals. 3M makes no claims as to the speed of removal. See 3M Instruction Bulletin 6.5 for details.

Shelf Life, Storage and Shipping

Shelf Life

The shelf life is **never more than three years** from the date of manufacture on the original box.
Processing the film changes its shelf life to **one year** from the processing date, but no later than three years from the manufacturing date.

Storage Conditions

- 40°F to 100°F (4°C to 38°C)
- Out of sunlight
- Clean, dry area
- Original container
- Bring the film to room temperature before use

Shipping Finished Graphics

Film with prespaced graphics using 3M™ Prespacing Tape SCPS-55 applied: Flat only

All other constructions: Flat, or rolled printed side out on 6 in. (15 cm) or larger core. This helps prevent the application tape, if used, from popping off.

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 for 3M products go to 3M.com/SDS. To request SDS by mail, or in case of an urgent situation, call 1-800-364-3577 or 1-651-737-6501.

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

Standards

This information is important for applications regulated by ASTM or NFPA® standards, for example, traffic control signs, emergency vehicles and certain railroad graphics. Users are solely responsible for determining and complying with all current and applicable local, state and federal regulations regarding the use and application of graphics materials.

ASTM D-4956: Standard Specification for Retroreflective Sheeting for Traffic Control

ASTM D-4956 covers flexible, non-exposed glass bead lens and microprismatic, retroreflective sheeting designed for use on traffic control signs, delineators, barricades, and other devices. For Type I sheeting, it specifically covers the following colors: white, yellow, orange, green, red, blue, and brown. As defined in ASTM D-4956, these products are classified as Type I sheeting with a Class 3 adhesive. For the corresponding colors covered by ASTM D-4956, with the exception of orange, these products meet the requirements specified in section 6.1.1.

NFPA ® 1901: Standard for Automotive Fire Apparatus (2016 Edition)

According to NFPA® 1901, section 15.9.3.3 specifies that all retroreflective materials required by section 15.9.3.1 and 15.9.3.2 shall conform to the requirements of ASTM D4956, *Standard Specification for Retroreflective Sheeting for Traffic Control*, Section 6.1.1 for Type I sheeting. Section 15.9.3.3.1 specifies that colors not listed in ASTM D4956 can be used on the front and sides of the fire apparatus as long as the sheeting has a minimum coefficient of retroreflection of 10 when measured with an observation angle of 0.2° and an entrance angle of -4°.

	Red	Ruby Red	Yellow	Lemon Yellow	White	Blue	Light Blue	Green	Gold	Black
Color Number	72	82	71	81	10	75	76	77	64	85
Section 15.9.3.1 (Front & Sides)	•	•	•	•	•	•	•	•	•	•
Section 15.9.3.2 (Chevrons)	•	•	•	•						

AAR: Standard and Recommended Practices

These products are approved for use by the Association of American Railroads (AAR), Safety and Operations, as listed in the Manual of Standards and Recommended Practices, Section C - Lettering and Marking of Cars, Specification M-947, Adhesive-Backed Films.

Warranty Information

Technical Information

The technical information, guidance, and other statements contained in this document or otherwise provided by 3M are based upon records, tests, or experience that 3M believes to be reliable, but the accuracy, completeness, and representative nature of such information is not guaranteed. Such information is intended for people with knowledge and technical skills sufficient to assess and apply their own informed judgment to the information. No license under any 3M or third party intellectual property rights is granted or implied with this information.

Product Selection and Use

Many factors beyond 3M's control and uniquely within user's knowledge and control can affect the use and performance of a 3M product in a particular application. Customer is solely responsible for evaluating the product and determining whether it is appropriate and suitable for customer's application, including conducting a workplace hazard assessment, reviewing all applicable regulations and standards, and reviewing the product label and use instructions. Failure to properly evaluate, select, and use a 3M product in accordance with instructions or to meet all applicable safety regulations may result in injury, sickness, death, and/or harm to property.

Warranty, Limited Remedy, and Disclaimer

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Limitation of Liability

Except for the limited remedy stated above, and except to the extent prohibited by law, 3M will not be liable for any loss or damage arising from or related to the 3M product, whether direct, indirect, special, incidental, or consequential (including, but not limited to, lost profits or business opportunity), regardless of the legal or equitable theory asserted, including, but not limited to, warranty, contract, negligence, or strict liability.

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