with Comply™ Adhesive Series 680CR

Quick Links

3M Graphics Warranties
Warranty Period Tables for 680CR
Technical Information Selector
Safety Data Sheets (SDS)
Flammability (ASTM E84 Reports)
Videos

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

Product Description

- For Screen Printing
- 7-mil, enclosed lens, retroreflective, engineer grade films that offer flexibility and versatility

Product Features

- Available in 11 colors, including black (which reflects white)
- Similar daytime and nighttime appearance that retains most of its reflectivity when wet
- Excellent angularity
- Pressure-activated adhesive for easy sliding and tacking
- Removable with heat and/or chemicals
- For vertical, flat, curved or corrugated surfaces, with or without rivets
- Air release channels for fast and easy, bubble-free graphic installation
- Expected Performance Life of 9 years for **Vehicle** application (unwarranted period for unprinted film with no graphic protection, applied to a flat, vertical, outdoor surface)
- Expected Performance Life of 7 years for **Rail** application (unwarranted period for unprinted film with no graphic protection, applied to a flat, vertical, outdoor surface)

Recommended Types of Graphics and End Uses

- Vertical commercial vehicle, railcar, and bus graphics
- Vertical non-regulated signs and striping
- Vertical indoor and outdoor signage

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.

IMPORTANT NOTE

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). This film is not recommended for use on stainless steel.

Recommended Compatible Products

See 3Mgraphics.com/warranties for a complete list of compatible 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 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™ Scotchcal™ Luster Overlaminate 8519
- 3M™ Screen Print Gloss Clear 1920DR
- 3M™ Screen Print UV Gloss Clear 9740i
- 3M™ Screen Print UV Gloss Clear 9800CL

Application Tapes

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

Characteristics

These are 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	At -4° entrance angle and 0.2° observation angle. **Film Number** / **Color Name** / **Typical Coefficient of Retroreflection** 680CR-10 / White / 100 680CR-14 / Orange / 20 680CR-64 / Gold / 70 680CR-71 / Yellow / 65 680CR-72 / Red / 20 680CR-75 / Blue / 10 680CR-76 / Light blue / 10 680CR-77 / Green / 20 680CR-81 / Lemon yellow / 75 680CR-82 / Ruby red / 15 680CR-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	Pressure-activated, slideabe with air release channels
Adhesive Color	Clear with silver underneath
Liner	Polyethylene-coated paper
Safety Standards	See "Health and Safety" on page 7 for ASTM, NFPA® and AAR information
Flammability	Call 1-800-328-3908 for information

Application Characteristics

Characteristic	Value
Finished Graphic Application Recommendation	**Substrate type:** aluminum, Fiberglass Reinforced Plywood (FRP), paint **Graphic Orientation:** Vertical only **Application method:** Dry **Application temperature:** air and substrate • Flat without rivets: 40–100 °F (4–38 °C) • Flat, curved or corrugated surfaces with rivets: 45–100 °F (7–38 °C)
Adhesion, Typical *24 hours after application*	**Aluminum** 4.8 pounds/inch (0.86 kg/cm) **FRP (Fiberglass Reinforced Plywood)** 3.7 pounds/inch (0.7 kg/cm) **Painted aluminum panels** 2.6 pounds/inch (0.5 kg/cm)
Temperature Range After Application	-30 to +200 °F (-34 to +93 °C) (not for extended periods of time at the extremes)
Graphic Removal	Removable with heat and/or chemicals from most substrates within specified warranty period.

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, found at 3Mgraphics.com/warranties, at the time that 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 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 - Unprinted Film

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

Warranty Period Matrices - Screen Printed Film

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

Additional Limitations

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.

Factors that Affect Graphic Performance Life

The actual performance life of a graphic is affected by:

- the combinations of graphics 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 or 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. Refer to the Product and Instruction Bulletins for your ink 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 the screen printed areas. Ink series 2900 and the transparent colors from ink series 9800 are good choices when retroreflection is important in the 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 needed for any corrugated application.

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 the "Recommended Compatible Products" on page 1 or see the 3M Graphics Market Product Catalog, for more information.

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

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.

ⓘ IMPORTANT NOTE

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

Application and Installation

ⓘ IMPORTANT NOTE

This film is not recommended for use on low surface energy substrates such as some plastics, powder-coated paint, etc. The user must assume responsibility for testing and approving these substrates.

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.

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 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 during graphic application to complex curves and deep contours as well as around rivets. When using heat during application, make sure 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 additional heat in the post-application process for vehicle graphics. During this process, 3M only recommends using a heat gun to make sure the film surface temperature reaches a minimum of 200° F (93° C) and does not exceed 225° F (107° C).

Pressure-activated Adhesive

The pressure activated adhesive on this film offers:

- smooth sliding into position on a substrate;
- fast finger tacking to check position; and

The **slideability 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.
- solvent from inkjet ink has not completely dried or cured.

Working with Air Release Channels

Air release channels are a characteristic of films with Comply™ adhesive that allow 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 to allow trapped air to exit through the air release channels. If the channels are closed off by firm pressure and air is trapped, use an air release tool to aid in removing air bubbles. See 3M Instruction Bulletin 5.4 for details.

Video

Click here to see how 3M's Comply™ adhesive technology works.

Maintenance and Cleaning

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 3M Instruction Bulletin 6.5 for details.

Removal

Removal requires heat and/or chemicals. The ease and rate of removal depends on a number of factors. See 3M Instruction Bulletin 6.5 for details.

Shelf Life, Storage and Shipping

Shelf Life

The shelf life is **never more than 3 years** from the date of manufacture on the original box.
If you process the film, the shelf life is changed to **1 year** from the processing date, but not later than the 3 year maximum from the manufacturing date.

Storage Conditions

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

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 inch (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 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.

Standards

This information is important for applications that are regulated by ASTM or NFPA® standards, for example, traffic control signs, emergency vehicles and certain railroad graphics. The user is 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 D4956-11a: Standard Specification for Retroreflective Sheeting for Traffic Control

ASTM D4956-11a covers flexible, non-exposed glass bead lenses and microprismatic retroreflective sheeting designed for use on traffic control signs, delineators, barricades and other devices. For Type I sheeting it specially covers these colors: white, yellow, orange, green, red, blue and brown. As defined in ASTM D4956-11a, film 5100 and films IJ5100-10 (white) are classified as Type I sheeting (section 4.2.1) with a Class 1 adhesive (section 4.3.1). For corresponding colors covered by ASTM D4956-11a, the aforementioned films (except orange) meet the requirements specified in section 6.1.1 (minimum performance requirements for Type 1 sheeting).

NFPA ® 1901: Standard for Automotive Fire Apparatus (2009 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

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

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. Please read the entire Bulletin thoroughly.

Release S DEC-2015:

- Updated to new format. Please read the entire Bulletin thoroughly.

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