



## 3M™ Scotchlite™ Reflective Graphic Film

Series 680

## 3M™ Scotchlite™ Reflective Graphic Film

IJ680-10

## 3M™ Scotchlite™ Removable Reflective Graphic Film with Comply™ Adhesive

680CR-10

## 3M™ Scotchlite™ Removable Reflective Graphic Film with Comply™ Adhesive

Series 680CR E

## 3M™ Scotchlite™ Removable Reflective Graphic Film

680R-10 E

### Product Bulletin

#### Product Description

These long-term durable films are designed for commercial vehicle, railroad and bus graphics, sign graphics, and striping on vertical, flat, curved or corrugated surfaces, with or without rivets.

Use these films for electrostatic or screen printing.

Unprocessed film resists fuel vapors or occasional spills.

3M™ Controltac™ minimizes the initial contact area of the adhesive and allows the applicator to reposition the film during application.

This allows easier installation of large format graphics in a wide temperature range.

Product variants with Comply™ adhesive also have air release channels for fast and easy, bubble-free graphic installations.

<b>Product Line</b>	Screen printing	680CR-10	white, retro-reflective, semi-matte, removable adhesive (clear and silver underneath) with Comply™.
		680R-10 E	white, retro-reflective, semi-matte, removable adhesive (clear and silver underneath).
		680CR E	X = color code, retro-reflective, semi-matte, removable adhesive (clear and silver underneath) with Comply™.
		680	X = color code, retro-reflective, semi-matte, permanent adhesive (clear and silver underneath).
	Inkjet printing	IJ680-10	white, retro-reflective, semi-matte, permanent adhesive (clear and silver underneath).

## Product Characteristics

These are typical values for unprocessed products.  
Contact your 3M representative for a custom specification.

### Physical & Application

Material	cast vinyl	
Surface finish	semi-matte	
Thickness (film)	180 µm (0.180 mm)	
Adhesive type	pressure-sensitive	
Adhesive appearance	clear	
Liner	double-sided Polyethylene coated paper	
Adhesion	approx. 22 N/25 mm	FTM 1: 180° peel, substrate: glass; cond: 24 h 23°C/50%RH
Application method	dry only!	
Applied shrinkage	0.4 mm	FTM 14
Application temperature	+13°C	minimum (air and substrate)
	versions with Comply:	+7°C
Notice!	flat surfaces without rivets require a minimum application temperature of +10°C, versions with Comply applied on flat surfaces without rivets require a minimum application temperature of +4°C	
Service temperature	-34°C to +93°C	
Surface type	flat to curved, incl. rivets and corrugations	
Substrate type	aluminum, paint	
	Notice!	Two-part polyurethane paints and clear coats may stop curing when the air and surface temperatures are lower than 24°C. Be aware that outgassing causes this sheeting to bubble.
Graphic removal	Hard to remove from supported substrates.	
	Notice!	Versions with Comply: Fair to remove with heat and/or chemicals from supported substrates.
<b>Storage</b>	Shelf life	Use within two years from the date of manufacture on the sealed original box. Use within one year after opening the box.
	Storage conditions	+4°C to +40°C, out of sunlight, original container in clean and dry area.

**Flammability** Flammability standards are different from country to country. Ask your local 3M contact for details, please.

### Durability

Unprocessed film	The following durability data are given for unprocessed film only!	
3M™ Performance Guarantee and MCS™ Warranty	In addition, 3M provides a guarantee/warranty on a finished applied graphic within the framework of 3M™ Performance Guarantee and/or 3M™ MCS™ warranty programs.	
	Visit <a href="http://www.3mgraphics.com">www.3mgraphics.com</a> for getting more details about 3M's comprehensive graphic solutions.	
Climatic zones	Graphic durability is largely determined by the climate and the angle of exposure. Find below a table showing the durability of a product according to the angle of exposure and the geographical location of the application.	
	Zone 1	Northern Europe, Italy (north of Rome), Russia
	Zone 2	Mediterranean area without North Africa, South Africa
	Zone 3	Gulf area, Africa
Exposure types	Vertical:	The face of the graphic is ±10° from vertical.



Interior Interior means an application inside a building without direct exposure to sunlight.

Vertical outdoor exposure	Zone 1	Zone 2	Zone 3
white/black	8 years	7 years	5 years
colors	8 years	7 years	5 years
Interior application	Zone 1	Zone 2	Zone 3
interior	8 years	8 years	8 years

## Limitations of End Uses

3M specifically does not recommend or warrant the following uses, but please contact us to discuss your needs to recommend other products.

Graphics applied to

- application to competitive flexible sign substrates.
- flexible substrates incl. 3M™ Panagraphics™ III Wide Width Flexible Substrate.
- low surface energy substrates or substrates with low surface energy coating.
- other than flat or moderate curved/corrugated surfaces.
- painted or unpainted wallboards, gypsum boards and wallpapers.
- stainless steel.
- substrates other than recommended.
- surfaces that are not clean and smooth.
- surfaces with poor paint to substrate adhesion.

Graphic removal from

- signs or existing graphics that must remain intact.

Important Notice

- 3M Commercial Solutions products are not tested against automotive manufacturer specifications!
- Graphics with more than two layers of film except as described in this bulletin are not recommended.
- using fluorescent film where black light fluorescent is needed.
- To avoid color variations all pieces of applied film of one colored area should be processed out of one lot of material.

## Special Information

The typical value of retroreflection is dependent on the film color.

It is measured at a 5° entrance angle and a 0.33° observation angle and expressed in candelas per lux per square meter [cd/(lx·m²)].

The entrance angle is formed by a light beam striking the surface at a point and at a line that is perpendicular to the surface at the same point. Unprinted film 680, 680CR, 680CR E has the following typical value of retroreflection.

film number	color name	typical value
IJ680-10	White	70 - 80
680CR-10	White	70 - 80
680-10 D/E	White	70 - 80
680-10	White	70 - 80

film number	color name	typical value
680CR-10 E	White	40
680R-10 E	White	40

film number	color name	typical value
680CR E, 680		
-14	Orange	15
-64	Gold	40
-71	Yellow	35
-72	Red	15
-75	Blue	7
-76	Light Blue	6
-77	Green	15
-81	Lemon Yellow	35
-82	Ruby Red	15
-85	Black	25

According to ECE104 film series 680CR E and 680R-10 E is approved Class E.

## Graphics Manufacturing

Graphic protection can improve the appearance, performance and durability of printed graphics. Any printed graphic exposed to abrasive conditions (including vehicles), harsh cleaners or chemicals must include graphic protection in order to be warranted.

When to use an overprint clear or overlaminate

See instruction bulletin GPO 'graphic protection options' for further information about selection and use of protective overlaminates and printable clears.

> [Product Bulletin Graphic Protection Options](#) <

Shipping finished graphics

Flat, or rolled film side out on 130 mm (5 inch) or larger core. These methods help to prevent the liner from wrinkling or application tape, if used, from popping off.

Matching

Whenever two or more pieces of the same reflective graphic film are seamed together as a continuous band of graphic film, they should be matched to assure uniform daytime and night appearance.

Material from a single roll or lot must be used on a single graphic or sign for identical matching.

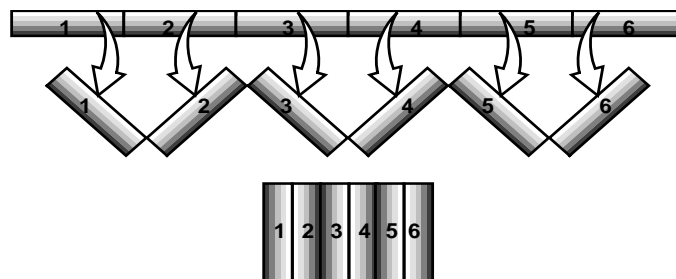
In general, reflective graphic film from a roll must be matched as shown in FIGURE 1. The dark line represents one edge of the film.

The matching edges are always swung to meet each other. Panels 1 and 2 are a matched set. Pieces 1, 2 and 3 are matched, etc. By following this method you can match as many sheets from a roll as are required for any size sign.

Exact match between different run numbers should not be assumed.

FIGURE 1

Matching



## Converting Information Inkjet Printing

A too high total physical ink amount on the film results in media characteristic changes, inadequate drying, overlaminate lifting, and/or poor graphic performance. The maximum recommended total ink coverage for this film is 270%.

Adequately Dry Graphics

Inadequate drying can result in graphic failure including curling, increased shrinkage and adhesion failure, which are not covered under warranty. Build enough time into your process to ensure adequate drying of the graphic.

Poorly dried film becomes soft and stretchy, and the adhesive becomes too aggressive. 3M recommends at least a minimum drying time of 24 hrs before further processing. Dry the graphic unrolled or at least as a loose wound roll standing upright.

## Converting Information Screen Printing

Formulations and processing conditions can affect ink durability. Refer to the 3M Product and Instruction Bulletins for your ink for limitations and proper usage. Graphic protection can improve the appearance, performance and durability of your graphic.

A clear coat also prevents chalking on unprinted films. Use equipment designed to handle high viscosity materials and make sure the coating is evenly applied to the specifications given in the clear's Instruction Bulletin.

Abrasion and  
Loss of Gloss

Abrasion damage and loss of gloss are not covered by any 3M warranty. This is considered normal wear and tear.

## Application

See product bulletin ATR 'application tape recommendations' for information about selection and use of suitable application tapes for this product, please.

[> Product Bulletin Application Tape Recommendations <](#)

Refer to Instruction Bulletin 5.1 'select and prepare substrates for graphic application', for general application information.

[> Instruction Bulletin 5.1 'select and prepare substrates for graphic application' <](#)

## 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).

Refer to Instruction Bulletin 6.5 'storage, handling, maintenance and removal of films and sheetings', for general maintenance and cleaning information.

[> Instruction Bulletin 6.5 'Storage, Handling, Maintenance and Removal of Films and Sheetings' <](#)

## Remarks

This bulletin provides technical information only.

Important notice

All questions of warranty and liability relating to this product are governed by the terms and conditions of the sale, subject, where applicable, to the prevailing law.

Before using, the user must determine the suitability of the product for its required or intended use, and the user assumes all risk and liability whatsoever in connection therewith.

Additional Information

Visit the web site of your local subsidiary at [www.3Mgraphics.com](http://www.3Mgraphics.com) for getting:

- more details about 3M™ MCS™ Warranty and 3M™ Performance Guarantee
- additional instruction bulletins
- a complete product overview about materials 3M is offering



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