3M™ Scotchcal™ Translucent Graphic Film Series 3630
3M™ Envision™ Translucent Film Series 3730

For Screen Printing, Cut Graphics and Thermoforming

Use film series 3630 for fluorescent lighting applications
Use film series 3730 for LED applications

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.

1. Product Description

A. Product Features

- 2-mil vinyl translucent films, available in crisp, clear colors (many with simulated PANTONE® color references)
- Matte surface finish eliminates glare and provides uniform color in reflected and transmitted light
- Pressure-sensitive adhesive adheres to rigid and flexible substrates
- Synthetic layflat liner that is not affected by water or humidity
- Cut electronically or thermoform
- Permanent film

B. 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 eligible for the 3M™ MCS™ Warranty. Please read the entire Bulletin for details.

- For indoor or outdoor use on internally-illuminated sign faces
- First and second surface application on rigid substrates
- First surface applications only on flexible substrates
- Thermoforming on rigid plastic surfaces
- For use with fluorescent bulbs or LEDs. Typically for best results, 3M recommends:
  - film series 3630 for fluorescent lighting applications.
  - film series 3730 for LED applications.

C. Performance Overview

3M tests the performance of both individual products and finished graphic constructions. This table shows the best performance expected from this product without a Warranty Period and with a Warranty Period.

For detailed graphic construction and application options along with specific Warranty Periods, please see the Warranty Information, Section 5 on page 5.

Expected Performance Life. This is the estimated period of time the product should perform satisfactorily.	
Unprinted film with no graphic protection, applied to a flat vertical outdoor surface.	7 years Unwarranted Period
3M™ MCS™ Warranty. This is the maximum period of time 3M will warrant the finished graphic performance.	
Unprinted film with the best graphic protection option, applied to a flat, vertical outdoor surface.	9 years Warranty Period

D. Limitations of End Uses

This 3M product is not designed or recommended for the following uses. Please contact us to discuss other options.

- Do not use for fleet graphics.
- Not suitable for inkjet printing.
- Do not use for graphic constructions with more than two layers of film, including the overlaminate, except as described in **Three Film Layer Constructions** on page 9.
- Do not use for graphics applied to:
  - surfaces with rivets or corrugations.
  - non-3M flexible substrates.
  - substrates with coatings such as silicone.

E. Special Considerations

We recommend weeding before thermoforming when using film with red pigments. The red pigments available to film manufacturers today can stain plastic when thermoformed.

3M is very successful at helping you match day/night colors when the same color density is required in front lit and backlit graphics to maximize the effectiveness of your sign. Please contact us for assistance when this is a concern.

2. Compatible Products

The following products 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. Click on the blue underlined text to view the Product Bulletin for that product.

See the **Warranty Information** section to determine which compatible products are approved for your graphic construction.

A. Screen Printing Inks

- 3M™ Screen Printing Ink Series 1900
- 3M™ Screen Printing UV Ink Series 9800

B. Films

- 3M™ Day/Night Film 3635-91
- 3M™ Day/Night Film 3635-0171
- 3M™ Diffuser Film 3635-30
- 3M™ Diffuser Film 3635-70
- 3M™ Envision™ Diffuser Film 3735-50
- 3M™ Envision™ Diffuser Film 3735-60
- 3M™ Blockout Film 3635-20B
- 3M™ Blockout Film 3635-22B
- 3M™ Dual-Color Film Series 3635-200

C. Substrates

- 3M™ Panagraphics™ III Wide-Width Flexible Substrate
- 3M™ Envision™ Flexible Substrate FS-1
- Flat, rigid substrates (see Application Characteristics on page 3)

D. Graphic Protection

- 3M™ Screen Print Gloss Clear1920DR
- 3M™ Scotchcal™ Gloss Overlaminate 3640GPS
- 3M™ Scotchcal™ Matte Overlaminate 3642GPS
- 3M™ Scotchcal™ Gloss Overlaminate 3658G
- 3M™ Scotchcal™ Matte Overlaminate 3660M
- 3M™ Screen Print UV Gloss Clear 9740i
- 3M™ Screen Print UV Gloss Clear 9800CL

E. Other Products

- 3M™ Prespacing Tape SCPS-2
- 3M™ Prespacing Tape SCPS-53X
- 3M™ Premasking Tape SCPM-3
- 3M™ Premasking Tape SCPM-44X

3. Characteristics

These are typical values for unprocessed product; processing may change the values. Contact your 3M representative for a custom specification.

A. Physical Characteristics

Characteristic	Value
Film material	Vinyl
Colors	**Film 3630**: Translucent, 57 colors **Film 3730:** Translucent, 20 colors *See Color Chart in Section C on page 4.*
Thickness	**Without adhesive:** 2 mils (0.05 mm) **With adhesive:** 3 to 4 mils (0.08 to 0.1 mm)
Adhesive type	Pressure sensitive
Adhesive color	Clear
Liner	Translucent, synthetic lay-flat liner
Adhesion *24 hours after application*	**Acrylic and uncoated, clear polycarbonate:** 4 pounds/inch (0.7 kg/cm)
Chemical resistance	Resists mild alkalis, mild acids, and salt Excellent resistance to water *(not immersion)*
Flammability	ASTM E84 reports: 3630 and 3730 or go to the On-line Product Catalog at 3Mgraphics.com **All other test reports:** call 1-800-328-3908

B. Application Characteristics

Characteristic	Value
Finished graphic application recommendation	**Surface type:** Flat, without rivets **Substrate type:** 3M flexible substrates; rigid substrates such as flat acrylic, polycarbonate, high temperature copolyester sheet, glass - These films typically adhere to solar-grade polycarbonate substrate. However, some lots of this substrate may inhibit film adhesion. Contact Technical Service if you are having difficulty. See 3M Instruction Bulletin 5.7 for additional information. - Polycarbonate substrates may require oven drying before use because outgassing of moisture from the polycarbonate may cause the film to bubble. Refer to the manufacturers' instructions. **Application method:** Wet, typical **Application temperature:** 60°F (16°C) *minimum air, substrate*
Temperature range after application	-50° to +170°F (-45° to +77°C) Impact at low temperatures of film applied to flexible substrates may result in cracking of the film and/or substrate.
Recommended light source *for best results*	**Film 3630:** Fluorescent bulbs **Film 3730:** LEDs
Graphic removal	Permanent film

C. Color Chart

Selected 3M product colors are a simulation of a PANTONE®-identified color standard. You can view these colors at 3Mgraphics.com. Go to Tools & Support, then Pantone® Color Reference. Use current PANTONE Color Publications for accurate color. PANTONE® is the property of Pantone LLC. ©Pantone LLC, 2013. Produced under License Agreement No. 813R between 3M and Pantone LLC.

Note: Color measurements are based on reflected light, not transmitted light.

(1) Film Series 3630

Product	Color	PANTONE Color	Product	Color	PANTONE Color
3630-005	Ivory	PANTONE 7500 C	3630-97	Bristol Blue	not available
3630-015	Yellow	PANTONE 116 C	3630-106	Brilliant Green	PANTONE 368 C
3630-20	White	not available	3630-108	Pink	PANTONE 224 C
3630-22	Black ♦	PANTONE Black C	3630-109	Light Rust Brown	PANTONE 7594 C
3630-25	Sunflower	PANTONE 130 C	3630-115	Lt. Lemon Yellow	not available
3630-26	Green	PANTONE 7727 C	3630-116	Bright Jade Green	not available
3630-33	Red	PANTONE 1797 C	3630-118	Intense Magenta	PANTONE 241 C
3630-36	Blue	PANTONE 281 C	3630-121	Silver	PANTONE 877 C
3630-43	Lt. Tomato Red	not available	3630-125	Golden Yellow	PANTONE 1235 C
3630-44	Orange	not available	3630-126	Dk Emerald Green	PANTONE 3425C
3630-49	Burgundy	not available	3630-127	Intense Blue	PANTONE 300 C
3630-51	Silver Gray	not available	3630-128	Plum Purple	PANTONE 525 C
3630-53	Cardinal Red	PANTONE 187 C	3630-129	Bronze	not available
3630-57	Olympic Blue	not available	3630-131	Gold Metallic	PANTONE 872 C
3630-59	Dark Brown	not available	3630-133	Raspberry	PANTONE 220 C
3630-61	Slate Gray	not available	3630-136	Lime Green	PANTONE 360 C
3630-63	Rust Brown	PANTONE 7610 C	3630-137	European Blue	PANTONE 2757 C
3630-68	Rose Mauve	not available	3630-141	Gold Nugget	not available
3630-69	Duranodic ♦	PANTONE Black 7 C	3630-143	Poppy Red	PANTONE 485 C
			3630-146	Light Kelly Green	PANTONE 340 C
3630-71	Shadow Gray	PANTONE Warm Gray 7 C	3630-147	Lt. European Blue	PANTONE 7690 C
			3630-149	Light Beige	not available
3630-73	Dark Red	PANTONE 7621 C	3630-156	Vivid Green	not available
3630-74	Kumquat Orange	PANTONE 151 C	3630-157	Sultan Blue	PANTONE 287 C
3630-75	Marigold	PANTONE 7549	3630-167	Bright Blue	PANTONE 2945 C
3630-76	Holly Green	PANTONE 7734 C	3630-236	Turquoise	PANTONE 3282 C
3630-78	Vivid Rose	PANTONE 206 C	3630-246	Teal Green	PANTONE 321 C
3630-83	Regal Red	not available	3630-317	Evening Blue	not available
3630-84	Tangerine	PANTONE 1575 C	3630-337	Process Blue	not available
3630-87	Royal Blue	PANTONE 2745 C			

(2) Film Series 3730

Product	Color	PANTONE Color	Product	Color	PANTONE Color
3730-015L	Yellow	PANTONE 116 C	3730-97L	Bristol Blue ❖	not available
3730-20L	White	not available	3730-106L	Brilliant Green	not available
3730-22L	Black ♦	PANTONE Black C	3730-125L	Golden Yellow	PANTONE 1235 C
3730-26L	Green ❖	PANTONE 7727 C	3730-127L	Intense Blue	not available
3730-33L	Red	PANTONE 186 C	3730-137L	European Blue ❖	not available
3730-35L	Light Gold	PANTONE 130 C	3730-156L	Vivid Green	PANTONE 348 C
3730-36L	Blue ❖	not available	3730-157L	Sultan Blue	not available
3730-43L	Lt. Tomato Red	PANTONE 1795 C	3730-167L	Bright Blue	PANTONE 2935 C
3730-44L	Orange	not available	3730-337L	Process Blue	not available
3730-53L	Cardinal Red ❖	PANTONE 200 C			
3730-73L	Dark Red	PANTONE 7621 C			

♦ Films 3630-22, 3630-69 and 3730-22L are effectively opaque for most sign uses.
❖ This film color was reformulated to increase the gain in light transmission when compared to the same color in film series 3630. Be aware there may be a slight color shift compared to previous lots.

(3) Custom Colors and Color Matching

- Custom colors are available by request. Pigment durability and manufacturing limitations do not permit exact color matching of all color shades.
- When viewed in reflected light and not illuminated, film series 3630 and 3730 appear similar in color.
- Because film series 3630 and 3730 are optimized for different light sources, an exact color match between these two colored films may not be possible when illuminated. 3M formulates the film series 3730 colors to the closest color match as possible; however, in some instances a slight color variation between the products may be noticeable in transmitted light.
- The “L” behind a color number (e.g., 3730-33L) designates the color is optimized for LED light sources.

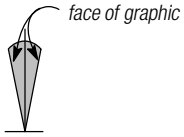
D. 3M Flexible Substrates

Important Note! The user is responsible for determining and complying with all applicable building codes that affect the use of materials in interior and exterior awning, banner and sign face applications, including flammability standards. For information on flammability requirements, contact your local building code officials. For information on the results of flammability testing on 3M flexible substrates, call 1-800-328-3908.

4. Definitions

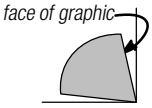
A. Exposure Types

U.S. Vertical Exposure



The face of the graphic is +/- 10° from vertical

U.S. Non-vertical Exposure



The face of the graphic is greater than 10° from vertical and greater than 5° from horizontal.

U.S. Desert Southwest Exposure Any outdoor graphic exposed to solar energy more than half of the daylight hours in Arizona, New Mexico and the desert areas of California, Nevada, Utah and Texas is subject to reduced warranties. A detailed map is available at 3Mgraphics.com.

B. Graphic Types

Indoor Signs Stationary graphics applied indoors and *not* exposed to the elements

Outdoor Signs Stationary graphics applied outdoors and exposed to the elements

C. Graphic Construction

The products used to make a graphic, which may include film and/or flexible substrate, graphic protection, ink, printer and application tape

D. Graphic Protection

Overlaminate films or clear coats used to protect the graphic and/or change gloss

5. Warranty Information

A. Warranty Coverage Overview

The Warranty coverage for each graphic is based on the user(s) both reading and following all applicable and current 3M Product and Instruction Bulletins. 3M will honor the Warranty Period stated in the base film's Product Bulletin that is current when 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 following is made in lieu of all other express or implied warranties, including any implied warranty of merchantability or fitness for a particular purpose or implied warranty arising out of a course of dealing, custom or usage of trade.

B. 3M Basic Product Warranty

This Product is warranted to be free of defects in materials and manufacture at the time of shipment and to meet the specifications stated in this Product Bulletin and as further set forth in the 3M Graphics Warranties Brochure.

C. Limited Remedy

3M will replace or refund the price of any 3M materials that do not meet this Warranty within the specified time periods. These remedies are exclusive.

D. Limitation of Liability

Except where prohibited by law, 3M SHALL NOT UNDER ANY CIRCUMSTANCES BE LIABLE TO PURCHASER OR USER FOR ANY DIRECT (EXCEPT FOR THE LIMITED REMEDY PROVIDED ABOVE), 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 SELLER'S 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 including breach of contract, breach of warranty, negligence, strict liability, or any other legal or equitable theory.

E. Additional Limitations

See the 3M Graphics Warranties Brochure at 3Mgraphics.com, which gives the terms, additional limitations of the Warranty, if any, and limitations of liability.

F. 3M™ MCS™ Warranty

Subject to Stipulations set forth in Section G, on page 7

Finished graphics constructed with the materials specified and the exposure specified in the Warranty Period Table, Section F(2), are eligible for the 3M™ MCS™ Warranty.

(1) Certificate of 3M™ MCS™ Warranty Requirement Only graphics manufacturers having a current Certificate of 3M™ MCS™ Warranty are eligible to extend this Warranty to their customers.

(2) Warranty Period
for Finished Graphics

Warranty Period for Finished Graphics

Non-Thermoformed Outdoor Signs							
				U.S. Exposure *(in Years)*		U.S. Desert Southwest Exposure *(in Years)*	
Substrate	**Application Surface**	**Decoration Method**	**Graphic Protection**	**Vertical**	**Non-Vertical**	**Vertical**	**Non-Vertical**
Panagraphics III, FS-1	First	Unprinted film	None*	6	0	4.2	0
	First	Unprinted film	3658G 3660M	9	6	6.3	4.2
	First	Printed with ink 1900	1920DR	5	0	3.5	0
	First	Printed with UV ink 9800	9800CL 9740i	5	0	3.5	0
PETG, Glass, Acrylic or Non-solar grade polycarbonate	First	Unprinted film	None*	6	0	4.2	0
	First	Unprinted film	3640GPS 3642GPS	9	6	6.3	4.2
	First	Unprinted film	3658G 3660M	9	6	6.3	4.2
	First	Printed with ink 1900	1920DR	5	4	3.5	2.8
	First	Printed with UV ink 9800	9800CL 9740i	5	4	3.5	2.8
Non-solar grade polycarbonate	Second	Unprinted film	None	6	0	4.2	0
Solar grade polycarbonate or UV grade PETG	Second	Unprinted film	None	9	6	6.3	4.2

* Although the durability of these constructions are warranted without graphic protection in a vertical orientation, 3M strongly recommends using graphic protection to keep the graphic looking good. See Section 5G(2) on page 8.

Warranty Period for Finished Graphics

Thermoformed Outdoor Signs					
				U.S. Exposure *(in Years)*	U.S. Desert Southwest Exposure *(in Years)*
Substrate	**Application Surface**	**Decoration Method*** **	**Graphic Protection**	**Complete Sign Face****	**Complete Sign Face****
Acrylic or Non-solar grade polycarbonate	First	Unprinted film	None	4	2.8
	First	Unprinted film	3640GPS 3642GPS	6	4.2
	First	Unprinted film	3658G 3660M	6	4.2
Acrylic or Non-solar grade polycarbonate	Second	Unprinted film	None	4	2.8
Solar grade polycarbonate	Second	Unprinted film	None	6	4.2

** When the thermoformed sign is vertically mounted.
*** Thermoformed signs not warranted for metallic colors 3630-121, 3630-131 or 3630-141.

G. General Warranty Stipulations for 3M™ MCS™ Warranty

These stipulations apply to the 3M™ MCS™ Warranty for these stipulations are covered in the 3M Graphics Warranties Brochure at 3Mgraphics.com.

(1) 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. However, to help maintain the appearance of your graphic, use the recommended graphic protection whenever it is required for the construction and end use as shown in the Warranty Period tables.

(2) Application Outside the U.S.

Contact the 3M organization for that country.

(3) Application to Glass

3M accepts no liability for glass breakage when using this film for window graphics. See 3M Instruction Bulletin 5.1 for details.

(4) Graphics Made with Components Not Sold or Recommended by 3M

The 3M™ MCS™ Warranty does not, under any circumstances, cover graphics made with ink, film, graphic protection and/or application tapes not sold or recommended by 3M.

The user is solely responsible for the graphic appearance, performance and durability of graphic constructions that include any non-recommended or non-qualified products.

6. Factors that Affect Graphic Performance Life

The actual performance life of a graphic is affected by:

- the correct combination of 3M-recommended graphics products.
- the ink formulation.
- adequate ink drying or curing.
- selection, condition and preparation of the substrate.
- surface texture.
- application methods.
- the angle and direction of sun exposure.
- environmental conditions.
- cleaning or maintenance methods.

7. Graphics Manufacturing

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

A. Illuminated Signs Require Special Consideration

Clear and translucent films tend to be more sensitive to shrinkage due to high total ink coverage. Film that is not sufficiently dried prior to creating an overlap may shrink and result in a light leak.

Backlighting any film, no matter how it is imaged, reduces the density of the colors on the image.

B. Illuminated Signs using LEDs

Making a successful sign requires that you consider many factors. This section provides general guidelines for illuminating signs using LEDs. Please contact Technical Service (1-800-328-3908) before you start for any questions or concerns about making a sign.

(1) Comparing Light Transmission using LEDs

This table compares film series 3730 on diffuser film 3735-50 (the "3730 construction") to film series 3630 on diffuser film 3635-30 (the "3630 construction") and shows:

- typical gains in light transmission that may be expected from the 3630 constructions to the 3730 constructions.
- a calculated percentage of LEDs needed in 3730 constructions to achieve the same brightness of 3630 constructions.

Light Transmission Comparison using LEDs

Film		Typical % Increase (Gain) in Light Transmission	% LEDs Needed for Equivalent Brightness**
Product Number 3630-xxx / 3730-xxx	**Color**	3730 on 3735-50 compared to 3630 on 3635-30	
015 / 015L	Yellow	25	80
20 / 20L	White	56	64
26 / 26L	Green	20 *	83 *
33 / 33L	Red	106	49
36 / 36L	Blue	46 *	68 *
43 / 43L	Lt. Tomato Red	66	60
44 / 44L	Orange	55	65
53 / 53L	Cardinal Red	65 *	61 *
73 / 73L	Dark Red	82	55
97 / 97L	Bristol Blue	32 *	76 *
106 / 106L	Brilliant Green	32	57
125 / 125L	Golden Yellow	48	68
127 / 127L	Intense Blue	71	58
137 / 137L	European Blue	33 *	75 *
156 / 156L	Vivid Green	69	59
157 / 157L	Sultan Blue	44	69
167 / 167L	Bright Blue	96	51
337 / 337L	Process Blue	80	56

* Value is effective for product manufactured *before* May 18, 2013 as shown on product label or core tag. For product manufactured after this date, contact 3M Technical Service for available data.

** See Calculating % LEDs for Equivalent Brightness, Section (2), on page 8.

(2) Calculating % LEDs for Equivalent Brightness

This value helps estimate how many LEDs may be eliminated in a sign construction to achieve the same level of brightness and is calculated from the following equation:

$$\% \text{ LEDS FOR EQUIVALENT BRIGHTNESS} = [\,1 / (1 + \text{GAIN})\,] \times 100; \text{ WHERE GAIN} = \% \text{ GAIN} / 100$$

Example: Using Lt. Tomato Red (color 43/43L), the percentage of LEDs needed in a film 3730 construction to achieve the same brightness as a film 3630 construction is as follows:

$$\% \text{ LEDS FOR EQUIVALENT BRIGHTNESS} = [\,1 / (1 + 0.66)\,] \times 100 = 60\%$$

This calculation estimates a 40% reduction in the number of LEDs in a film 3730 construction to yield the same brightness as a film 3630 construction.

(3) Color-to-Color Variation for Gain

The variation in gain from color to color can be attributed to the different film color formulations. In general, every color in film series 3630 and 3730 produces its own unique light transmission value.

(4) Other Considerations for Signs using LEDs

- A significant reduction in LEDs may affect other performance factors of an illuminated sign, such as uniformity. The user is responsible for ensuring the LED layout meets all of its intended performance requirements.
- If the brightness of signs created using a film 3630 construction is acceptable, then:
  - a comparable brightness may be achieved using films 3730 with fewer LEDs.
  - a similar level of brightness for white may be maintained.
  - an acceptable sign face uniformity may be maintained without requiring any change to the light box depth if the LED layout is adjusted properly.
- Some sign box manufacturers prefer to apply color translucent films directly to a rigid diffuse substrate, such as a diffuse polycarbonate or acrylic, to disperse the light instead of using diffuser film. In this case, the gain in light transmission would be less than the values shown in the Light Transmission Table in Section 7B(1) on page 9, which are based on using diffuser film.
- See 3M Instruction Bulletin 4.60 for some additional guidelines and suggestions when using 3M™ Envision™ Translucent and Diffuser Films.

Video Watch a brief lightbox demonstration comparing film series 3730 to film series 3630.

C. 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.

Graphic protection can improve the appearance, performance and durability of your graphic. A clear coat also prevents chalking on unprinted films.

Whether you apply screen print clears with traditional screening methods or roller coating, use equipment designed to handle high viscosity materials and make sure the coating is evenly applied to the specifications in the clear's Instruction Bulletin.

D. Construction Options

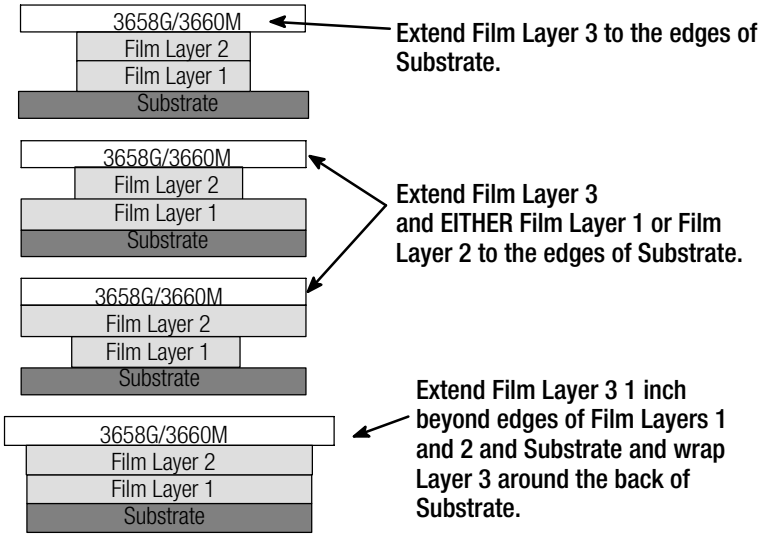
Refer to 3M Instruction Bulletin 4.26 for detailed information.

Important Note!

A third layer of film on any one surface is warranted *only* if the top layer is an approved overlaminate and no more than two layers of any film are even with the edges of the substrate.

NEVER place an overlap over an existing overlap, which creates four layers.

FIGURE 1
Three Film Layer Constructions



E. Thermoforming

Refer to 3M Instruction Bulletin 5.16 for detailed information.

CAUTION

Film series 3630 and 3730 emit vapors during the thermoforming process. Be sure to read and follow the information contained on the box label and in the Instruction Bulletin 5.16 before thermoforming.

F. Channel Letter Faces

When using film series 3630 or 3730 on rigid plastic channel letter faces, avoid contact with the adhesive used to attach the trim cap edge. These adhesives attack film and cause curling, lifting and premature failure of the film.

G. Spray Painting

Film series 3630 and 3730 can be spray painted with Grip-Flex™ or Lacryl™ diffuser paints with good performance. However, the performance or application of the paints is not warranted.

H. Cutting

The following are common cutting methods for this film. See 3M Instruction Bulletin 4.1 for details.

(1) Cutting Methods

For individual pieces, use one of these cutting methods.

- Hand cut
- Die cut
- Kiss cut
- Electronic cutter

For multiple pieces, use one of these cutting methods.

- Guillotine
- Die cut

(2) Minimum Cutting Heights

Based on cutting and weeding evaluations that used Helvetica medium upper case, the recommended minimum cutting height for text is 1 inch (2.54 cm). Because of the differences in electronically-controlled cutting equipment and font characteristics, users should determine their own cutting and weeding capability.

(3) Inside and Outside Corners

For inside and outside corners of cut out letters and symbols, and the pointed end of stripes, cut the largest radius consistent with an acceptable appearance. This technique helps avoid stress cracking due to age, and lifting of pointed ends during maintenance.

(4) Factors that Affect Cutting Quality and Ability

- Sharpness of the knife blade. Dull blades create a serrated look to the cut edge of the film scores the liner. Too little weight does not cut completely through the film and the adhesive. Excessive weight cuts the liner. It also causes the blade to drag, accelerating wear and eventually creating a serrated cut edge on the film.
- Temperature and relative humidity are minor considerations, but avoid extreme or rapidly fluctuating conditions.
- Store the film in the same environment as the cutting equipment.
- Consider the stroke width of characters, style of serifs or extensions, and small details of scanned or digitized artwork.
- The minimum recommended stroke width is 0.040 inch (1.0 mm) when film is exposed to cleaning or other physical stress.

I. Application Tapes

(1) When to Use Premasking Tape

- Use as an application aid to increase stiffness, and prevent stretching and damage during application.

(2) When to Use Prespacing Tape

- Hold cut and weeded letters or graphics in registration after removing the film liner.
- Protect cut graphic parts from scratching or damage during application.
- Use when large amounts of liner are exposed.

(3) How to Select a Tape

Determine whether you want to premask the graphic or prespace film elements. Then locate the graphic protection on your graphic in the table below, and use the corresponding tape. See 3M Instruction Bulletin 4.3 for complete details.

EXAMPLE: If the film has no graphic protection and you want to premask the film, use premasking tape SCPM-3.

Select the tape based on what is on top of the graphic

Tape	Unprinted	3642GPS 3660M	1920DR Ink Series 1900	9800CL 9740i Ink Series 9800	3640GPS 3658G
Premasking SCPM-3	■	■	■	—	—
Prespacing SCPS-2	■	■	■	—	—
Premasking SCPM-44X	—	—	—	■	—
Prespacing SCPS-53X	—	—	—	■	—

— = This application tape is not recommended for this construction.

8. Application and Installation

- For application by hand, the detergent and water application method is recommended for this pressure-sensitive film. Dry application by hand may leave some dark streaks or bubbles that could be visible in transmitted light. Refer to 3M Instruction Bulletin 5.7.
- For roll lamination, the dry method is acceptable.

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

- Hot and cold roll lamination. 3M Instruction Bulletin 4.22.
- General guidelines for backlit signs. 3M Instruction Bulletin 4.60.
- Application of 3M pressure sensitive films to 3M Flexible Substrates. 3M Instruction Bulletin 5.30.
- Application, special applications and vehicles. 3M Instruction Bulletin 5.4.
- Application, general procedures for indoor and outdoor dry applications. 3M Instruction Bulletin 5.5.

9. 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 3M Instruction Bulletin 6.5 for general maintenance and cleaning information.

10. Shelf Life, Storage and Shipping

A. Shelf Life

Total shelf life: 3 years from the date of manufacture on the original box.
If you do process the film, do so within 2 years and apply within 1 year.
If you do not process the film, apply it within 3 years.

B. 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

C. Shipping Finished Graphics

Flat (may be separated by paper), or rolled printed side out on 5 inch (13 cm) or larger core. This helps prevent the liner and, if used, the application tape from popping off.

11. 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/MSDS, 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.

12. Bulletin Change Summary

Modified and new content is marked with a black bar in the margin. 3M™ Envision™ Flexible Substrate FS-1 is a new approved flexible substrate. Removed reference to 3M™ Panaflex™ Awning and Sign Facing 945GPS, which has been discontinued. Added requirement for Certificate of 3M™ MCS™ Warranty. The 3M Related Literature section has been replaced by direct links to the most current versions of Bulletins or warranty information you may need to successfully use this product. All links are blue underlined text. All electrostatic products have been removed from this bulletin.

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