



# Scotchcal™

## Translucent Graphic Film Series 230

### Description

3M™ Scotchcal™ Translucent Graphic Film Series 230 has been specially formulated by 3M for Gerber Scientific Products, Inc. and is available exclusively from an authorized Gerber distributor. This 2 mil, cast vinyl graphic film has a clear, permanent, pressure sensitive adhesive and a synthetic liner that does not split even when wet. Its matte surface eliminates glare and provides a uniform color in both reflected and transmitted light. This film is thermoformable. To find a Gerber distributor near you, contact Gerber at 1-800-222-7446 or visit their website at [www.gspinc.com](http://www.gspinc.com).

### Advantages

- EDGE READY™ material
- Designed for electronic cutting
- Withstands severe weather and handling conditions
- Long term interior and exterior durability
- Transparent, synthetic liner has superior layflat characteristics in all shop humidity conditions and facilitates with multi-color registration

### Recommended Types of Graphics and End Uses

Film series 230 is intended for making permanent, durable, electronically-cut graphics when used with the listed Compatible Products in the following applications. These applications are warranted by the 3M™ MCS™ Warranty.

- Prespaced, electronically-cut graphics
- For interior or exterior use on:
  - The listed compatible substrates
  - Internally-illuminated sign faces
  - Internally-illuminated awnings protected by overlamine 3640GPS or 3642GPS
- For first surface application to Panaflex awning and sign facing materials
- For thermoforming with rigid plastic surfaces under well-controlled conditions as described in Instruction Bulletin 5.16

### Limitations of Uses

We do not normally warrant other applications, but please contact us to discuss your needs or let us suggest other 3M products.

### Unsuitable End Uses for This Film

- Application to competitive awnings, sign facings and other flexible substrates
- Application to substrates having coatings such as silicone
- Graphics with more than two layers of film, except as described in **Three Film Layer Constructions**, see page 4
- Graphics made for automotive Original Equipment Manufacturers (OEM); contact 3M Automotive Division at 1-800-328-1684 for alternatives.

### Compatible Products

- 3M™ Screen Printing Ink Series 1900
- 3M™ Screen Printing Ink Series 9700UV
- 3M™ Panaflex™ Awning and Sign Facing 945GPS
- 3M™ Panagraphics™ II Intermediate Flexible Substrate
- 3M™ Scotchcal™ High Gloss Overlamine 3640GPS and Matte Overlamine 3642GPS (for enhanced cleaning and durability)
- 3M™ Prespacing Tape SCPS-2 and SCPS-53X
- 3M™ Premasking Tape SCPM-3 and SCPM-44X
- Additional flat, rigid substrates such as flat acrylic, polycarbonate\*, copolyester sign sheet, glass

### About Polycarbonates

\* Film series 230 typically adheres to solar-grade polycarbonate substrate. However, some lots of this substrate may inhibit the adhesion of this film. Contact 3M Commercial Graphics Technical Service (see page 6) if you are having difficulty with this combination. See Instruction Bulletin 5.7 for additional information.

Polycarbonate substrates may require drying by baking before use. Refer to the manufacturers' instructions.

Note: For the full product names of the 3M products listed on this page, please see page 1.

## Characteristics

All values given are typical and are not for use in specifications. Please contact the Technical Service helpline at 1-800-328-3908 if you need more detailed information.

Characteristic	Description
Film	2 mil, translucent cast vinyl
Colors	See Color Chart
Thickness (film and adhesive)	3 to 4 mil (0.003 to 0.004 mm)
Adhesive	Clear, pressure sensitive
Liner	Transparent, synthetic liner
Application surfaces	Flat, without rivets
Minimum application temperature	60°F (16°C) ( <i>air, film, substrate</i> )

Property	Value
Tensile strength	5 pounds/inch at 73°F (0.9 kg/cm at 23°C)
Applied shrinkage	0.015 inch (0.4 mm)
Service temperature range*	-50° to +170°F (-45° to +77°C)
Adhesion (acrylic and uncoated, clear polycarbonate)	4.0 pounds/inch (0.7 kg/cm) ( <i>Value given is for 24 hours after application.</i> )
Chemical Resistance	Resists mild acids, alkalis, and salts  Excellent water resistance

\*Impact at low temperatures of film applied to flexible substrates may result in cracking of the film and/or substrate.

## Color Chart

3M™ Scotchcal™ Translucent Graphic Film Series 230							
230-005	Ivory	230-57	Olympic Blue	230-97	Delft Blue	230-133	Raspberry
230-105	Yellow	230-59	Dark Brown	230-106	Apple Green	230-141	Gold Nugget
230-20	White	230-61	Slate Gray	230-108	Pink Lavender	230-143	Poppy Red
230-22	Black <sup>1</sup>	230-63	Rust Brown	230-115	Lemon Yellow	230-146	Kelly Green
230-25	Sunflower	230-69	Duranodic <sup>1</sup>	230-116	Bright Jade Green	230-147	Deep Sky Blue
230-26	Green	230-71	Shadow Gray	230-118	Mulberry	230-149	Light Beige
230-33	Red	230-73	Dark Red	230-121	Silver	230-156	Vivid Green
230-36	Dark Blue	230-74	Kumquat Orange	230-125	Mango	230-157	Cobalt Blue
230-43	Light Tomato Red	230-76	Holly Green	230-126	Emerald Green	230-167	Blue
230-44	Orange	230-78	Vivid Rose	230-127	Intense Blue	230-236	Turquoise
230-49	Burgundy	230-83	Scarlet Red	230-128	Plum Purple	230-246	Teal
230-51	Silver Gray	230-84	Tangerine	230-131	Gold Metallic	230-337	Process Blue
230-53	Cardinal	230-87	Royal Blue				

<sup>1</sup> This film is effectively opaque for most sign usages.

## Warranty Information

### Graphic Performance Life

The graphic performance life is based on field experience and exposure tests conducted throughout the United States. When the graphics are processed and used according to 3M recommendations, they should have the performance life shown in the Warranted Durability Table.

The actual performance depends on the:



- Selection and preparation of the substrate
- Application methods
- Exposure conditions
- Cleaning methods
- Correct combination of film, ink, and clear coat (screen printing only)
- Ink formulation (screen printing only)
- Drying methods (screen printing only)

*Continued on the next page.*

Note: For the full product names of the 3M products listed on this page, please see page 1.

## Warranted Durability

The warranty given in the Product Bulletin that is current at the time you purchased the film is the one that 3M will honor.

Film	 <b>Vertical Exposure</b> face of graphic is $\pm 10^\circ$ from vertical	 <b>Non-Vertical Exposure</b> face of graphic is $>10^\circ$ from vertical		
	<b>U.S.<sup>1</sup></b> years	<b>S.W.<sup>2</sup></b> years	<b>U.S.<sup>1</sup></b> years	<b>S.W.<sup>2</sup></b> years
<b>Unprinted film series 230 applied to Panagraphics II substrate</b>				
First surface	5 pro-rated monthly <sup>3</sup>	3 pro-rated monthly <sup>3</sup>	0	0
First surface overlaminated with 8519 or 8520	5 pro-rated monthly <sup>3</sup>	3 pro-rated monthly <sup>3</sup>	0	0
<b>Unprinted film series 230 applied to other compatible first surface substrates</b>				
First surface	6	5	0	0
First surface overlaminated with 3640/3642-114GPS	9	6	6	4
First surface thermoformed	4	2	0	0
First surface thermoformed, overlaminated with 3640/3642-114GPS	6	5	0	0
<b>Unprinted film series 230 applied to compatible second surface substrates</b>				
Second surface on acrylic and NON-solar grade polycarbonate	6	5	0	0
Second surface on solar grade polycarbonate	9	6	6	4
Second surface on acrylic and NON-solar grade polycarbonate, thermoformed	4	2	4	2
Second surface on solar grade polycarbonate, thermoformed	6	5	6	4
<b>Printed film series 230 applied to Panagraphics II substrate</b>				
With ink series 1900 and clear coat 1920	5 pro-rated monthly <sup>3</sup>	3 pro-rated monthly <sup>3</sup>	0	0
With ink series 9700UV and clear coat 9720UV	5 pro-rated monthly <sup>3</sup>	3 pro-rated monthly <sup>3</sup>	0	0
<b>Printed film series 230 applied to other compatible substrates</b>				
With ink series 1900 and clear coat 1920	5	4	4	3
With ink series 9700UV and clear coat 9720UV	5	4	4	3

<sup>1</sup> For the warranty periods outside the United States, contact the 3M sales organization for that country.

<sup>2</sup> The United States Desert Southwest area includes Arizona, New Mexico, and the desert areas of California, Nevada, Utah, and Texas. A detailed map is available by request.

<sup>3</sup> The sole remedy for graphics made with film series 230 and Panagraphics II is a materials only reimbursement that is pro-rated on a monthly basis. For the pro-rated warranty, reimbursement is calculated by number of months remaining divided by original expected warranty term. For example, if 12 months remains of the original expected 60 months, the reimbursement may be up to 12/60 or 1/5 the cost of the materials.

Note: For the full product names of the 3M products listed on this page, please see page 1.

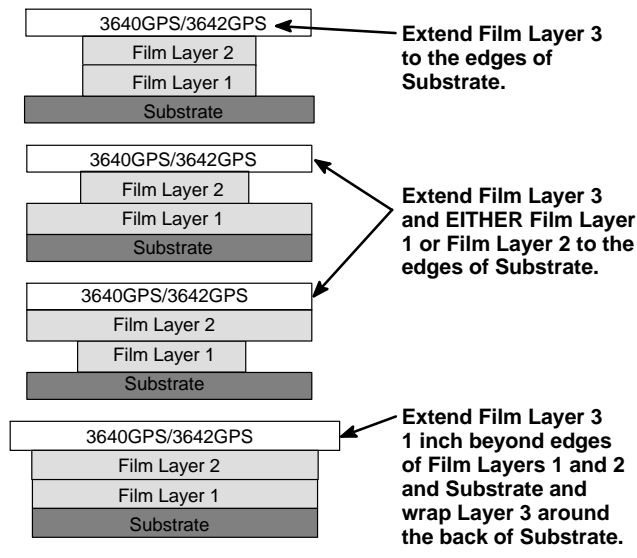
## Fabrication

This Bulletin does not contain detailed printing, processing, or application procedures. Refer to the 3M Related Literature section for further information.

### Three Film Layer Constructions

#### Important Note

A third layer of film on any one surface is warranted *only* if the top layer is overlamine 3640GPS or 3642GPS and no more than two layers of any film are even with the edges of the substrate. Therefore:



The following example is a Color By Day / White By Night graphic, which is typical of a construction that requires three film layers. See Figure 1.



Figure 1. Example of Color By Day/White By Night

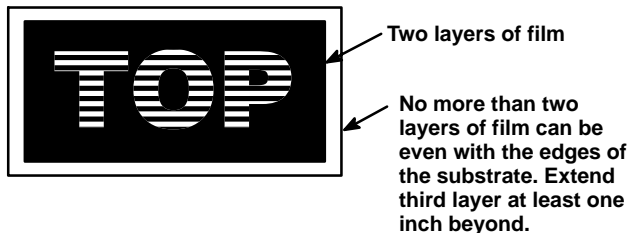


Figure 2. Extend Film 3640/3642GPS Beyond Edges of Other Film Layers

## Thermal Transfer Printing

Film series 230 has been optimized for use with the GERBER EDGE®, GERBER EDGE® 2 and GERBER EDGE FX™ thermal transfer systems.

## Cutting

### 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.

These factors can affect cutting quality and ability:

- **Sharpness of the knife blade.** Dull blades create a serrated look to the cut edge of the film.
- **Weight on the knife blade.** The ideal weight slightly 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.

## Thermoforming

Refer to Instruction Bulletin 5.16 for detailed information.

### Caution

Scotchcal translucent film series 230 emits vapors during the thermoforming process. Be sure to read and follow the information contained in the Material Safety Data Sheet (MSDS), the box label, and Instruction Bulletin 5.16 before thermoforming.

## Channel Letter Faces

When using film series 230 on rigid plastic channel letter faces, avoid contact with the adhesive used to attach the trim cap edge. These adhesives attack film series 230 and cause curling, lifting and premature failure of the film.

Note: For the full product names of the 3M products listed on this page, please see page 1.

## Spray Painting

Initial results indicate that film series 230 can be spray painted with Grip-Flex® or Lacryl™ paints with good performance. However, the performance or application of the paints is not warranted.

## Application Tapes

The type of premasking tape or prespacing tape used for film series 230 depends on the type of graphic produced and the ink or clear coat that was applied last. See Instruction Bulletin 4.3 for details.

- Use a premasking tape if very little of the liner is exposed.
- Use a prespacing tape if the graphic has large amounts of exposed liner.

Film	Premasking Tape	Prespacing Tape
Unprinted film	SCPM-3	SCPS-2
Ink series 1900	SCPM-3	SCPS-2
Ink series 9700UV	SCPM-44X	SCPS-53X

## Application

For application by hand, the detergent and water application method is recommended. Dry application by hand may leave some dark streaks or bubbles that could be visible in transmitted light.

For roll application, the dry method is acceptable.

Refer to 3M Related Literature on page 5 for a list of instruction bulletins that discuss application.

## Shelf Life, Shipping, and Storage

- Unprocessed film has a shelf life of two years after receipt. Processed film has a shelf life of one year. However, the total shelf life of a graphic before and after processing cannot exceed two years.
- Store the film in a clean, dry area, out of direct sunlight, and at less than 100°F (38°C).
- Ship the finished graphic lying flat or in a roll. To roll the graphic, wrap it film-side out onto a core that is 6 inches (15 cm) or larger in diameter. These methods help prevent the liner and premask from wrinkling or popping off.

## Health and Safety

### Caution

When handling any chemical products, read the manufacturer's container labels and the Material Safety Data Sheets (MSDS) for important health, safety and environmental information.

To obtain MSDS sheets for 3M products:

- By fax, call 1-800-364-0768 in the US and Canada or 1-650-556-8417 for all other locations.
- Electronically, visit us at <http://www.3m.com/msds>.
- 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.

### 3M Flexible Substrates

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, including the product covered in this bulletin from 3M Commercial Graphics Division, call 1-800-328-3908.

## Warranty and Limited Remedy

*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:* Film series 230 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. 3M will replace or refund the price of any 3M materials that do not meet this warranty within the specified time periods. See the worldwide 3M™ MCS™ Warranty ([www.Scotchprint.com](http://www.Scotchprint.com) or Fax-on-Demand), which gives the terms and limitations of the warranty.

**These remedies are exclusive. In no case shall 3M be liable for any direct, indirect or consequential damages, including any labor or non-3M material charges.**

Note: For the full product names of the 3M products listed on this page, please see page 1.

## 3M Related Literature

**Before starting any job, be sure you have the most current product and instruction bulletins.**

The information in 3M bulletins is subject to change. Current bulletins, as well as a list of all bulletins updated within the last three months, are available at [www.scotchprint.com](http://www.scotchprint.com) or through our Fax-on-Demand system. Any warranty, if offered, is based on information in the bulletin that was current at the time you purchased the 3M products. The following bulletins provide the information and processes you need to properly make the graphics described in this bulletin.

Fax-on-Demand phone numbers:  
 United States or Canada: 1-800-364-0768  
 International: 1-651-732-6506

Subject	Bulletin No.	FOD No.
<b>Product Bulletins</b>		
3M™ Panaflex™ Awning and Sign Facing 945GPS	945	4006
3M™ Panagraphics™ II Intermediate Flexible Substrate	Panagraphics II	4010
3M™ Screen Printing Ink Series 1900	1900	2501
3M™ Screen Printing Ink Series 9700UV	9700	2507

Subject	Bulletin No.	FOD No.
<b>Instruction Bulletins</b>		
Design of markings	2.1	5501
Screen printing with ink series 1900 - 4-color	3.12	6012
Screen printing with ink 9700UV	3.4	6004
Scoring and cutting	4.1	6501
Using 3M application tapes; premasking and prespacing for films	4.3	6503
Application, substrate selection, preparation and substrate-specific application techniques	5.1	7001
Application, wet method for translucent screen printed, thermal mass transfer and cut graphics	5.7	7007
Application and attachment of graphics	5.21	7021
Thermoforming	5.16	7016
Storage, maintenance, handling, and removal	6.5	7505
<b>Warranties</b>		
Worldwide 3M™ MCS™ Warranty		9503

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### Bulletin Change Summary

The liner material is synthetic. 3M™ Panaflex™ Enhanced Image Sign Facing 645EI has been discontinued. Added Panagraphics II flexible substrate and premasking tape SCPM-44X as compatible products. Updated format of some information. Other changes are indicated by black bars in the margins.



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