FS-1

Product Description

- 22-mil, white pigmented vinyl substrate with a polyester scrim
- For Inkjet Direct Printing, Film and Cut Film Decoration

Product Features

- Smooth front surface with a semi-gloss finish
- Decorate first or second surface with inkjet direct printing or first surface film
- Wide width, splice free for seamless backlit signs
- Medium to long-term durability
- Cost-effective
- Enhanced Light Transmission for LED light boxes (See "Characteristics" on page 3 for more details)
- Expected Performance Life of 6 years (unwarranted period for undecorated (no direct print or applied film) substrate with no graphic protection and properly mounted in a flat, vertical orientation for outdoor signage)

Recommended Types of Graphics and End Uses

- Indoor and outdoor, day and night graphics for backlit signs mounted in a properly designed cabinet or frame

Typically for best result, 3M recommends:

- 3M™ Envision™ Flexible Substrate FS-1 for LED applications
- 3M™ Panagraphics™ III Wide Width Flexible Substrate for fluorescent lighting applications.

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.

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.

(i) IMPORTANT NOTE

Be sure the printer you are using is capable of supporting the weight and roll diameter of flexible substrate FS-1 to avoid damaging the printer.

To estimate the weight, multiply the roll width by 54.5 oz (61 kg).
Example: 59 (width in inches) X 54.5 = 3125 oz. (201 lb)
1.5 (width in meters) X 61 = 91.5 kg

Recommended Compatible Products for 3M™ MCS™ Warranty

- 3M™ Scotchcal™ Translucent Film Series 3630
- 3M™ Scotchcal™ Translucent Film IJ3630-20
- 3M™ Scotchcal™ Translucent Film Series 3730
- 3M™ Scotchcal™ Translucent Film IJ3730-50
- 3M™ Scotchcal™ Translucent Film IJ3730-60

3M

Light Management Films

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

Low Cost Translucent Signage

- 3M™ Scotchcal™ Opaque Film Series 50 *for unwarranted graphics only*

Graphic Protection for Direct Print Graphics

- 3M™ Scotchcal™ Luster Overlaminate 3619
- 3M™ Scotchcal™ Matte Overlaminate 3620
- 3M™ Scotchcal™ Gloss Overlaminate 3658G
- 3M™ Scotchcal™ Matte Overlaminate 3660M
- 3M™ Scotchcal™ Gloss Overlaminate 8518
- 3M™ Scotchcal™ Luster Overlaminate 8519
- 3M™ Scotchcal™ Matte Overlaminate 8520
- 3M™ Scotchcal™ Ultra Matte Overlaminate 8915

NOTE: If you are decorating the substrate with film series 3630 or 3730 or films IJ3630 or IJ3730, refer to your decorating film's 3M Product Bulletin for the recommended Graphic Protection options.

Application Tapes

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

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.

Characteristics

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

Characteristics

Characteristic	Specification	Test Method
Substrate	White-pigmented vinyl with a polyester scrim	
Thickness	20–24 mil (0.51–0.60 mm)	Micrometer
Roll Sizes	A variety of widths ranging from 59 inches to 165 inches x 164 feet (150 cm to 420 cm x 50 m)	
Light Transmission	46% ± 3% *Uprocessed Envision flexible substrate FS-1 provides nearly twice the light transmission as unprocessed Panagraphics III substrate (23% ± 3%)*	Densitometer
Service Temperature Range	-22 to +158 °F (-30 to +70 °C) (not for extended periods of time at the extremes)	N/A
Installation Temperature	45 °F (7 °C) or higher See"Attaching and Tensioning" on page 8	N/A
Tensile Strength (warp & weft)	Min 100 lbs/in (440 N/25 mm)	ASTM D751-06
Elongation (warp & weft)	Max 50%	ASTM D751-06
Tear Strength	**Warp:** Typical 30 lbs/in (135 N) **Weft:** Typical 20 lbs/in (90 N)	ASTM D751-06
Thread Count (warp & weft)	500 denier 18 ± 1 threads per inch (threads/ 25 mm)	ASTM D1577-07 FS 191A 5050
Interfacial Adhesion	Min 8 lbs/in (35N/25 mm)	ASTM D751-06
Weight	19 ounces/sq. yd (650 gf/sq. m) See Important Note about roll weight in "Recommended Types of Graphics and End Uses" on page 1	Balance
Maximum Finished Size	625 sq. ft (58 sq. m) per warranted face	N/A
60 degree Gloss	5–15 at 60° gloss	ASTM D2457
Whiteness Index (reflective)	Min 90	ASTM E313
Flammability	Various reports	Call 1-800-328-3908
Safety and Regulatory Recognition	Call 1-800-328-3908	UL Recognized Component. Tested and found to comply with UL 879 - Standard for Electric Sign Components. US & Canada file E65361.

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 at the time that the film was purchased. Information found at 3MGraphics.com/warranties includes:

- 3M Graphics Warranties Bulletin
  - This bulletin contains information on limitations and exceptions, and warranty period reductions for 3M Graphics Warranties. The warranty period may be reduced and stipulations may apply for certain constructions, applications, and graphic exposures as covered in this Bulletin.
- 3M Graphics Warranties Selector
  - Use this selector to search for your vertical warranty period by product type, ink type, film name, and/or ink/printer platform.
- U.S. Desert Southwest Region Map
  - Use this map of hot, arid desert areas to determine if you are subject to reduced warranted durabilities.

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.

Exposure Types

U.S. Vertical Exposure

The face of the graphic is ±10° from vertical.

U.S. Horizontal Exposure

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

NOTE: Any outdoor graphic primarily located in Arizona, New Mexico, and the desert areas of California, Nevada, Utah, and Texas is subject to reduced warranties. Click here for a detailed map or go to 3Mgraphics.com/warranties. See "Reduced Warranty Period for Other Graphic Exposures" on page 5 for reduced warranty period information.

Warranty Period Matrices - Inkjet

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

Warranty Period Matrices - Cut Film

Table A. Substrate Warranty Period (in years) for Finished Graphics in a Standard U.S. Vertical Exposure when decorated with 3M Translucent Colored Film.

Graphic Film	Ink Series	Graphic Protection	Outdoor
None	None	None	6
3630	None	None	6
3730	None	3658G, 3660M	9

Warranty Period Matrices - Screen Printed

Table B. Substrate Warranty Period (in years) for Finished Graphics in a Standard U.S. Vertical Exposure when decorated with Screen Printed 3M Translucent Colored Film.

Graphic Film	Ink Series	Graphic Protection	Outdoor
3630	Refer to 3M Product Bulletin 3630/3730 for ink and graphic protection recommendations.		
3730			

Warranty Period Matrices - Inkjet Printed

Table C. Substrate Warranty Period (in years) for Finished Graphics in a Standard U.S. Vertical Exposure when decorated with Inkjet Printed 3M Translucent Film.

Graphic Film	Ink Series	Graphic Protection	Outdoor
IJ3630-20 IJ3730-50 IJ3730-60	Refer to 3M Product Bulletin IJ3630/3730 . All constructions shown in that Bulletin carry the same warranty when applied to Panagraphics III.		

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 correct combinations of 3M-recommended graphics products.
- the ink formulation.
- 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

Making Graphics with Film Series 50, 3630, 3730, IJ3630, IJ3730

Image the film according to the methods described in the related 3M Product Bulletin.

- For film application use a wet application method or dry roll lamination method.
- Apply no more than three layers (two layers of base film and an overlaminate) to the substrate.
- The minimum recommended decorating temperature is 60 °F (15 °C).

⚠ CAUTION

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

Inkjet Printing

Always read and follow the ink manufacturer's written instructions on usage.

Backlit Ink Density

ⓘ IMPORTANT NOTE

Double-sided Inkjet printing allows for a balanced day/night graphic appearance. A backlit image with proper color density can be achieved by printing a single strike image directly on both the first and second surface of the substrate. The second surface print must be reversed and registered to the first surface print. Consult with your printer manufacturer for process guidance.

Total Ink Coverage

Backlit images require greater density. This can be achieved by using the printer's double strike input mode (if available). When using this mode, you have reached the maximum total ink coverage when you can no longer obtain color consistency throughout the graphic and/or the graphic cannot be adequately dried after printing.

- **For most graphics:** 280% total ink coverage. See the Ink's Product Bulletin for more information.
    - Solvent ink: 270% total ink coverage. See the Ink's Product Bulletin for more information.
- **For three layer printers with white ink:** 660% (280% colors + 100% white + 280% colors maximum). The ink and printer combinations this is approved for are:
    - EFI™ VUTEk® QS2000, QS3200, QS3220, and QS220 Printers using 3M™ Piezo Inkjet Series 2800UV
    - EFI™ VUTEk® Pv200 Printers using 3M™ Piezo Inkjet Series 2200UV
    - EFI™ VUTEk® GS5000r Printers using EFI™ VUTEk® GSr 3M™ Premium UV Inks
- **For 1500v2, direct inkjet printing:** Printing in double strike mode is required to ensure adequate backlit color density and image durability.
- **For 4400, direct inkjet printing:** Printing in SD backlit mode is required to ensure adequate backlit color density and image durability.

Do not exceed the recommended total ink coverage for the ink series used on this product. Having too high a total physical ink amount on the product results in media characteristic changes, incomplete drying, overlaminate lifting, and/or poor graphic performance. For additional details about total ink coverage, refer to the 3M Product and Instruction Bulletin for 3M Inks.

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 Graphic Warranty.

See the ink's 3M Product and Instruction Bulletin for more details.

Construction Options

See 3M Instruction Bulletin 4.26 for detailed information.

Maximum Three Layers of Film

> ⓘ **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.

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 Product Bulletin 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.

Application and Installation

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 4.1 Sheeting, Scoring and Film Cutting
- 3M Instruction Bulletin 4.22 Lamination Basics for Inkjet Printed Graphics
- 3M Instruction Bulletin 5.1 Select and Prepare Substrates for Graphic Application
- 3M Instruction Bulletin 5.30 Application of 3M Pressure-Sensitive Films to 3M Flexible Substrates
- 3M Instruction Bulletin 5.5 Application, General Procedures for Interior and Exterior Dry Application
  - For roll application, the dry method is acceptable.
- 3M Instruction Bulletin 5.7 Application, Wet Method for Translucent, Inkjet, Screen Printed and Cut Graphics
  - For applications by hand, the detergent and water application method is recommended for this pressure-sensitive film. Dry application by hand may leave dark streaks or bubbles that could be visible in transmitted light.
- 3M Instruction Bulletin 6.5 Storage, Handling, Maintenance, and Removal of Films and Sheetings

Attachment and Tensioning Guidelines

Attaching and Tensioning

- 3M recommends attaching and tensioning this substrate in a cabinet at a temperature of 45 °F (7 °C) or higher, whether the work is being done in a fabricator's shop or in the field.
- Any existing attachment system used currently should be tested prior to actual application.

Cold Temperature Field Installation

- Artificially warm the decorated substrate to at least 45 °F (7 °C) before attaching or tensioning the sign face in a cabinet or frame.
- Do not stress the decorated substrate by folding, crimping, creasing, or forming it around corners. In cooler temperatures, the films applied to the substrate become less flexible and may crack if handled roughly.
- Check and re-tension large sign faces as needed when the temperature warms to more than 60 °F (15 °C). A large sign face is one that is more than 275 square feet (25 sq. m) and has a height that exceeds 11 feet (3.3 m) or a width that exceeds 25 feet (7.5 m).

Maintenance and Cleaning

Use only a mild detergent and water for cleaning. Clean the finished graphic annually. Clean the graphic more often in unusually dirty environments to maintain a good appearance. See 3M Instruction Bulletin 6.1 for details.

Shelf Life, Storage and Shipping

Shelf Life

This substrate may be stored for up to **6 months** undecorated and up to an additional **6 months** under the following Storage Conditions:

- Out of sunlight
- In a cool, dry environment
- Original container
- Bring the film to print room temperature before using

Rolling a Finished Sign Face for Shipping

Follow these guidelines if the graphics already have been applied to the substrate.

Selecting a Core Size

- For a graphic with a single film layer, use a core at least 3 inches (7.6 cm) in diameter.
- For a graphic with multiple film layers, use a core at least 6 inches (15 cm) in diameter.

Rolling the Graphic

- Roll the graphic with the graphics facing out to help prevent damage.
- Do not use masking tape, which may stain the substrate, to secure the roll.

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.

ⓘ IMPORTANT NOTE

The user is responsible for determining and complying with all applicable building codes that affect the use of materials in sign face applications, including flammability standards. For information on flammability requirements, contact your local building code officials.

Bulletin Change Summary

Rev D MARCH-2016

- Updated test method listed in "Characteristics" on page 3.

Rev C JULY-2015:

- Added detail related to which printer and ink combinations are warranted for use with white ink. See "Total Ink Coverage" on page 6.

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