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Commercial Solutions Division

3M™ Envision™ Flexible Substrate FS-1

Product Description

3M™ Envision™ Flexible Substrate FS-1 is a wide-width flexible substrate for LED illuminated signs. This flexible substrate is printable with solvent, UV or latex inks.

Product Line   Illuminated signage   Envision™ FS-1   white, translucent, glossy

Product Characteristics

Physical & Application

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

Material	white-pigmented vinyl with a polyester scrim
Surface finish	glossy
Thickness (film)	550 µm - 590 µm (0.55 mm - 0.59)
Light transmission	46% ± 3%
Weight	650 g/m²
Tensile strength	
- Down web	17 kg / cm
- Cross web	17 kg / cm
Tear strength	
- Down web	34 kg / cm
- Cross web	38 kg / cm
Elongation cross web/ down web	max 50%
Maximum finished size	58 m² per warranted face
Installation temperature	min +7°C
Service temperature	-30°C to +70°C (not for extended periods of time at the extremes)

The values above are the results of illustrative lab test measurements and shall not be considered as a commitment from 3M.

Storage

Shelf life	1 year after receipt from 3M, unprocessed. Up to 6 months decorated.
Storage conditions	+4°C to +40°C, out of sunlight, original container in clean and dry area.

The shelf life as defined above remains an indicative and maximum data, subject to many external and non-controllable factors. It may never be interpreted as warranty.

Flammability

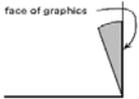Flammability standards are different from country to country. Ask your local 3M contact for details, please.

Durability

The durabilities mentioned in the table below are the results of illustrative lab tests. The values show the best performance expected from these products, provided that the film will be processed and applied professionally according to 3M's recommendations.
The durability statements do not constitute warranties of quality, life and characteristics.
The durability of products is also influenced by:
- the type of substrate and thorough preparation of the surface (with 3M™ Surface Preparation System)

- application procedures

- environmental factors

- the method and the frequency of cleaning

Unprocessed film	The following durability data are given for unprocessed film only!
Notice!	Flexible Substrate FS-1 that is decorated with cut, colored film 3M™ Scotchcal™ Translucent Graphic Film 3630 / 3M™ Envision™ Translucent Graphic Film 3730 and protected with 3M™ Scotchcal™ Gloss Overlaminate 3658G / 3M™ Scotchcal™ Matte Overlaminate 3660M (full web applied) for outdoor signage will be warranted up to 10 years (Zone 1). This is the maximum period of time 3M will warrant the finished graphic performance.
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.

face of graphics

Vertical outdoor exposure	Zone 1	Zone 2	Zone 3
	8 years	6 years	3 years

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. For detailed graphic construction and application options along with specific Warranty periods, please see the Warranty matrices and Warranty information on 3M Graphic Solutions/Warranties. Visit www.3mgraphics.com for getting more details about 3M's comprehensive graphic solutions.

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
- removing existing graphics and reusing the substrate
- graphic decoration with more than three layers of flexible substrate (base flexible substrate plus overlaminate)
- using 3M™ Scotchcal™ Overlaminate 3640GPS or 3642GPS for graphic protection

Important Notice
- 3M Commercial Solutions products are not tested against automotive manufacturer specifications!

Graphics Manufacturing

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.

Important Notice
Inkjet Inks and Printers

	Ink Series	Printer
(1) Solvent Inkjet Inks	- 3M™ Piezo Inkjet Ink Series 1500v2	- EFI™ VUTEk® 150, 2360/3360, 3300/5300 & 3000/5000 Printers
	- 3M™ Piezo Inkjet Ink Series 4400	- HP XLJet 1200 and 1500 Printers
	- SIIT GX 3M™ Ink Series	- Seiko I Infotech ColorPainter H Series H-74s, H2-74s, H-104s, H2-104s & W-64s Printers
	- SIIT SX 3M™ Ink Series	- Seiko I Infotech ColorPainter M-64s Printers
(2) Latex Inkjet Inks	- HP 3M™ LX600 Specialty Latex Ink	- HP Designjet L65500; Scitex LX600, LX800, LX820 & LX850; Latex 820 & 850 Printers
	- HP LX610 Latex Ink	- HP Designjet L65500; Scitex LX600, LX800, LX820 & LX850; Latex 820 & 850 Printers
	- HP 792 Latex Ink	- HP Designjet L28500 (Latex 280) Printers
	- HP 881 Latex Ink	- HP Latex 3000 Printer

(3) UV Inkjet Inks and Printers	- 3M™ Piezo Inkjet Ink Series 2800UV	- EFI™ VUTEk® QS2000, QS3200, QS3220 and QS220 Printers
	- EFI™ VUTEk® GS 3M™ Premium UV Inks	- EFI™ VUTEk® GS2000, GS3200 & GS3250 Printers, including GS Pro Series
	- EFI™ VUTEk® GSr 3M™ Premium UV Inks	- EFI™ VUTEk® GS5000r & GS3250r Printers
	- EFI™ R3225 3M™ UV Ink	- EFI™ R3225 UV Roll-to-Roll Printer
	- EFI™ VUTEk® GSLXr3M™ SuperFlex UV Ink	- EFI™ VUTEk® GS3250LXr Pro Printer

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.

Making Graphics with 3M™ Envision™ Translucent Graphic Film Series 3730, 3M™ Scotchcal™ Translucent Graphic Film Series 3630 or 3M™ Scotchcal™ Graphic Film Series 50, and 100

Applying to Envision™ Flexible Substrate FS-1, film series 3630, Envision™ film series 3730 can be screen printed and/or electronically cut and film series 3M™ Scotchcal™ 50 and 100 can only be electronically cut. Apply the film to the substrate using the wet application method or dry/roll lamination for front-lit graphics. No more than two layers of film may be applied to the substrate. The minimum decorating temperature recommended is +7°C. See paragraph Tensioning and Attaching.

Refer to Instruction Bulletin FS-1 'Application of Flexible Substrate for Backlit Illuminated Signs using LEDs', for application information.

> Application of Flexible Substrate for Backlit Illuminated Signs using LEDs <

Converting Information
Direct Inkjet Printing

This substrate can be direct printed using the solvent, latex or UV inkjet inks recommended in this Bulletin.
For the best results, follow the printing guidelines and procedures in the Product & Instruction Bulletin for the inks you are using.

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: 300% total ink coverage.
For three layer printers with white ink: 660%, (280% colors + 100% white + 280% colors maximum).

Double-sided Inkjet Printing for Backlit Images

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.

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.

Recommendations to improve the drying of solvent inks

Dry the graphic unrolled or at least as a loose wound roll standing upright. To further increase air circulation place the spooled film roll on a grid, and place a fan beneath the grid.

If you only spool open the film, adequate drying could still take a week, depending on the environment.

Build enough time into your process to ensure adequate drying of the graphic. 3M recommends at least a minimum drying time of 24 hrs before further processing. Test: Fold a piece of film with maximum ink laydown of the graphic onto itself. Apply 140 g/cm² for 15 minutes, release and check for effects like sticking or dull spots. These are clear indications that further curing or drying is needed.

Poorly dried flexible substrate becomes soft and stretchy, and the adhesive becomes too aggressive. Build enough time into your process to ensure adequate drying of the graphic. 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.

When direct printing on Envision™ Flexible Substrate, an inadequately dried image may result in these problems, which are not covered by any 3M Warranty:
- prevent the overlaminate from adhering well.
- distort the image if the printed substrate is rolled immediately.
- cause transport problems when printing the second side.
When printing on film that will be cut and applied to Envision™ Flexible Substrate, refer to the film's Product Bulletin for details about drying.

Notice: Latex inks are different

Unlike solvent inks, spooling and letting latex printed graphics sit does not help to cure the ink, but does allow the graphic manufacturer to see if any oily spots are generated which may interfere with proper adhesion of overlaminates.

To ensure proper latex ink drying, use the following recommendations:

Media Presets: HP media presets contain all the needed settings to print on a specific media.
Download and use media presets from the following page: www.hp.com/go/mediasolutionslocator.

Environmental Conditions: HP media presets have been specially designed and tested for each printer-media combination. Recommended environmental conditions: 20 to 25°C), Humidity 40 - 60% RH

Important notice for HP831/871 & HP881/891 latex inks

The amount of ink printed is the main key for proper overlaminate adhesion. Select a media preset using 100% or less ink density.

Post-processing of latex printed graphics immediately

Latex inks should emerge from the printer fully dried. Post-air drying of a wet print will not enable drying, since latex ink drying requires that the dried ink is heated above the film formation temperature of the latex For immediately post-processing of latex printed graphics follow strictly the recommendations given above (Section: Latex inks are different) and test the proper drying with the following performance tests:

Visual Test: Check the image immediately after printing. The sample should not be wet or sticky to the touch, or have an 'oily' feel when it emerges from the printer.

Rubbing Test: After the visual inspection, wipe the printed sample with a white wet paper towel nd should not show any stains on the white cloth. Fully-dried ink should resist wiping. If the ink is easily removed by wet rubbing, then it is not dried.

Stacking Test: In some cases, the top surface will appear dry after printing but within a few minutes ink may migrate to the surface leaving an oily aspect. To ensure proper drying, stack at least 12 sheets liner to printed side and let sit for one hour.

After 1 hour, remove the stack and check for "oily" stains, wet surfaces or glossiness changes on high ink laydown areas on each sheet. If any of these occur, then the ink is not properly dried.

If a sample is not properly dried on the printer, reprint the image under a condition that allows complete drying. Common improvement steps are:

- Increasing the drying temperature in 5 degree steps.
- Increasing the number of passes to slow down printing.
- Reducing the amount of ink printed (media preset with lower ink densities).

Allow the converted graphic to build sufficient bond prior to application/installation

Give laminated samples time before applying them. The adhesion bond between the laminate and the printed base film will increase with time. 24 hours minimum for room temperature laminated graphics.

8 hours minimum for graphics laminated with heated rolls (one or two). Lamination temperature: +40°C to +60°C. Lamination speed: maximum 2 meter/minute.

Attaching and Tensioning

3M recommends attaching and tensioning this substrate in a cabinet at a temperature equal to or more than +7°C, whether the work is being done in a fabricator's shop or in the field.

Cold temperature field installation

Artificially warm the decorated substrate to at least +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 +15°C.
A large sign face is one that is more than 25 m² and has a height that exceeds 3.3 m or a width that exceeds 7.5 m.

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).

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.

As outdoor graphics age, natural weathering occurs causing a gradual reduction in gloss, slight color changes, some lifting of the graphic at the edges or around rivets, and ultimately a minor amount of cracking.

These changes are not evidence of product failure and are not covered by a 3M warranty.

Additional information

Visit the web site of your local subsidiary at 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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