



# Scotchcal™ Graphic Film

## IJ3650-10, IJ3650-114, FN3650-114, RG3650-114\*

For Solvent, UV and Latex Inkjet Printing Only

### 1. Product Description

These are 2-mil, opaque white or translucent films with a permanent, pressure-sensitive adhesive. They are an excellent choice for medium-term cut graphics or single panel vertical graphics and signs.

\*Film RG3650-114 is available for purchase and use with only a 3M Basic Product Warranty on a customer test and approve basis.

### 2. 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 warranted by the 3M™ MCS™ Warranty or the 3M Performance Guarantee. Please read the entire Bulletin for details.

- Film IJ3650-114 and FN3650-114 (transparent) vertical graphics for:
  - Indoor and outdoor translucent graphics and signs for windows
  - Two way graphics
  - Backlit graphics
- Film IJ3650-10 (white) vertical graphics for:
  - Indoor and outdoor opaque graphics, signs and markings

### (3) Limitations of End Uses

#### a. This film is not suitable for these uses

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

- Fleet graphics
- Application to corrugated surfaces
- Stainless steel
- Graphics subjected to gasoline vapors or spills at gas pumps, automobile fuel-tank ports, or top-feeding, petroleum tankers.
- Non-vertical graphics
- Multi-panel graphics as overlapping joints will show as a dark line

Note: 3M Commercial Graphics Division policy is not to support applications of clear film when a driver's view is obstructed and/or where local laws prohibit its use.

#### b. Light Passage Laws and Regulations



#### CAUTION

Some states have laws or regulations requiring minimum light passage that may limit or preclude the use of transparent film IJ3650-114 and FN3650-114 on vehicle windows. The user is responsible for determining and complying with all applicable standards.

#### c. Important Information About Bus Applications

Film used on buses must not be applied so as to restrict the safe use of emergency window exits. See the most current version of Instruction Bulletin 5.4 for details.

### 3. Compatible Products

For complete details about graphic construction options, recommended uses and durability or expected performance life, refer to the Product Bulletin for the base film or substrate you are using. See **3M Related Literature** at the end of this Bulletin.

**A. Solvent Inkjet Inks and Printers**

Ink Series	Printer
• 3M™ Piezo Inkjet Ink Series 1500v2	EFI™ VUTEk® 150, 2360/3360, 3300/5300 and 3000/5000 Printer
• 3M™ Piezo Inkjet Ink Series 4400	HP XLJet 1200 and 1500 Printers
• 3M™ Piezo Inkjet Ink Series 4800	HP Scitex TJ8300, TJ8350 Series Digital Press*
• 3M™ Piezo Inkjet Ink Series 5500	Océ Arizona 600 Printer
• 3M™ Piezo Inkjet Ink Series 6200	Agfa :Jeti 3312, 3318, 3324, 5024 [Gandinovations] Printers

**B. Latex Inkjet Inks and Printers**

• HP 3M LX600 Specialty Latex Ink	HP Designjet L65500, Scitex LX600 & LX800 Printers
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**C. UV Inkjet Inks and Printers**

• 3M™ Piezo Inkjet Ink Series 2200UV	EFI™ VUTEk® PV200 Printer
• 3M™ Piezo Inkjet Ink Series 2600UVv2	3M™ Printer 2500UV
• 3M™ Piezo Inkjet Ink Series 2700UV	Durst Rho 160R, 351R Printers
• 3M™ Piezo Inkjet Ink Series 2800UV	EFI™ VUTEk® QS2000, QS3200, QS3220 and QS220 Printers
• 3M™ Piezo Inkjet Ink Series 5400UV	HP Designjet H35000/45000 Printers
• Mimaki Ink Series LF-200	Mimaki UJV-160 Printer

**D. Graphic Protection**

• 3M™ Scotchcal™ Luster Overlamine 3619
• 3M™ Scotchcal™ Matte Overlamine 3620
• 3M™ Scotchcal™ Gloss Overlamine 8518
• 3M™ Scotchcal™ Luster Overlamine 8519
• 3M™ Scotchcal™ Matte Overlamine 8520
• 3M™ Scotchcal™ Luster Overlamine 8908
• 3M™ Scotchcal™ Matte Overlamine 8909
• 3M™ Scotchcal™ Ultra Matte Overlamine 8915
• 3M™ Screen Print Gloss Clear 1920DR
• 3M™ Screen Print Gloss Clear 9720UV
• 3M™ Screen Print Gloss UV Clear 9720i

**E. Other Products**

• 3M™ Edge Sealer 3950
• 3M™ Premasking Tape SCPM-3
• 3M™ Premasking Tape SCPM-44X
• 3M™ Prespacing Tape SCPS-2
• 3M™ Prespacing Tape SCPS-53X

**4. 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	Description
Film	Vinyl
Colors	<b>IJ3650-10:</b> White <b>IJ3650-114, FN3650-114:</b> Transparent
Thickness	<b>Without adhesive:</b> 2 mils (0.05 mm) <b>With adhesive:</b> 3 to 4 mils (0.08 to 0.1 mm)
Adhesive type	Pressure sensitive
Adhesive color	Gray
Liner	Polyethylene-coated paper

*Continued on the next page*

Characteristic	Description
Tensile strength	5 pounds/inch at 73°F (0.9 kg/cm at 23°C) <i>minimum</i>
Liner	Polyethylene-coated paper
Adhesion <i>24 hours after application</i>	<b>ABS:</b> 4 pounds/inch (0.7 kg/cm) <b>Acrylic enamel:</b> 4 pounds/inch (0.7 kg/cm) <b>Fruehauf pre-painted panels:</b> 4 pounds/inch (0.7 kg/cm) <b>Aluminum, anodized:</b> 8 pounds/inch (1.4 kg/cm) <b>Chrome:</b> 5 pounds/inch (0.9 kg/cm)
Chemical resistance	Resists mild alkalis, mild acids, and salt Excellent resistance to water ( <i>this does not include immersion</i> )
Flammability	Call 1-800-328-3908 for information

**B. Application Characteristics**

Characteristic	Description
Finished graphic application recommendation	<b>Surface type:</b> Flat, with and without rivets <b>Substrate type:</b> Glass, metal, paint, fiberglass reinforced plastic, rigid plastic <b>Application temperature:</b> 50° to 100°F (10° to 38°C) <i>air and substrate</i> <b>Application method:</b> Dry
Applied film shrinkage	0.015 inch (0.4 mm)
Finished graphic exposure temperature	-65° to +225°F (-54° to +107°C)
Graphic removal	Permanent

**5. Definitions**

**A. Exposure Types**

**U.S. Vertical Exposure**



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

**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 under Warranties.

**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.

**Railroad**

Graphics applied on railroad cars but not railroad engines.

**OEM**

Labels and decorative graphics produced for and used by original equipment manufacturers.

**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**

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

## 6. Warranty Information

### A. Limitations and Disclaimers Applicable to All Warranties & Warranty Coverage Overview

Both the warranty coverage and the durability for each graphic is based on the user(s) reading and following all applicable and current 3M Product and Instruction Bulletins. 3M will honor the Warranted Durability stated in the base film or substrate Product Bulletin that is current when the film was purchased. Warranted durabilities 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. 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. **In no case shall 3M be liable for any direct, indirect, or consequential damages, including any labor or non-3M materials charges.**

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

### B. 3M Basic Product Warranty

All 3M products are 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 Market Center Warranty Brochure.

### C. 3M™ MCST™ Warranty

Subject to Stipulations set forth in Section E., below

Finished graphics constructed with the materials specified and the exposure specified in the Warranted Durability Tables, Section C.(1), is eligible for the 3M™ MCST™ Warranty. For warranties for other exposures, see Section E.(1).

#### (1) Warranted Durability Table for Finished Graphics in a Standard U.S. Vertical Exposure

VEH = Vehicle  
OUT = Outdoor Signs  
IN = Indoor Signs

<i>Warranted Durability, in Years</i>											
			HP VUTEK® 150, 2360/ 3360, 3300/5300, 3000/5000 Printers			HP XLJet Series 1200, 1500 Printers			HP Scitex TJ8300 and TJ8350 Digital Presses		
			SOLVENT Ink Series 1500v2			SOLVENT Ink Series 4400			SOLVENT Ink Series 4800		
Graphic Protection	VEH	OUT	IN	VEH	OUT	IN	VEH	OUT	IN		
3619, 3620	—	6	8	—	6	8	—	6	8		
8518, 8519, 8520, 8915	—	4	8	—	4	8	—	4	8		
8908, 8909	—	1	3	—	1	3	—	1	3		
1920DR	—	3	5	—	—	—	—	3	5		
9720UV	—	—	—	—	—	—	—	3	5		
9720i	—	4	8	—	4	8	—	4	5		
none	—	2	2	—	2	3	—	2	3		

  

			Agfa :Jeti 3312, 3318, 3324, 5024 [Gandinovations] Printers			Océ Arizona 600 Printer			Designjet L65500; Scitex LX600 & LX800 Printers		
			SOLVENT Ink Series 6200			SOLVENT Ink Series 5500			HP 3M LX600 Specialty Latex Ink		
Graphic Protection	VEH	OUT	IN	VEH	OUT	IN	VEH	OUT	IN		
3619, 3620	—	6	8	—	6	8	—	3	5		
8518, 8519, 8520, 8915	—	4	8	—	4	8	—	3	4		
8908, 8909	—	1	3	—	1	3	—	—	—		
1920DR	—	4	8	—	4	8	—	2	3		
9720UV	—	—	—	—	4	8	—	—	—		
9720i	—	4	8	—	4	8	—	—	—		
none	—	3	3	—	3	3	—	—	—		

<i>Warranted Durability, in Years</i>									
	EFI™ VUTEK® PV200 Printer			3M™ Printer 2500UV			Durst Rho 160R & 351R Printers		
	Ink Series 2200UV			Ink Series 2600UVv2			Ink Series 2700UV		
Graphic Protection	VEH	OUT	IN	VEH	OUT	IN	VEH	OUT	IN
3619, 3620	—	6	8	—	6	8	—	6	8
8518, 8519, 8520, 8915	—	4	8	—	4	8	—	4	8
1920DR	—	—	—	—	4	8	—	—	—
9720i, 9720UV	—	4	8	—	4	8	—	4	8
none	—	3	3	—	3	3	—	3	3

  

	EFI™ VUTEK® QS2000, QS3200, QS3220, QS220 Printers			HP Designjet H35000/45000 Printers			Mimaki UJV-160, JFX-1631 & 1615R Printers		
	Ink Series 2800UV			Ink Series 5400UV			Ink Series LF-200		
Graphic Protection	VEH	OUT	IN	VEH	OUT	IN	VEH	OUT	IN
3619, 3620	—	6	8	—	6	8	—	—	—
8518, 8519, 8520, 8915	—	4	8	—	4	8	—	3	8
1920DR	—	—	—	—	—	—	—	—	—
9720i, 9720UV	—	4	8	—	4	8	—	—	—
none	—	3	3	—	3	3	—	—	—

**D. 3M Performance Guarantee**

Subject to Stipulations set forth in Section E., below

Graphics constructed with the 3M materials specified and in the exposure specified in the Warranted Durability Table, Section D.(1), are eligible for the 3M Performance Guarantee. This warranty only covers the performance of the recommended 3M products used in the graphic construction when imaged with the printers and OEM inks listed in the most current version of Performance Guarantee Printer and Ink Matrix at 3Mgraphics.com. The Matrix may also list certain restrictions for using the film covered in this Bulletin. For warranties for other exposures, see Section E.(1).

*Warranted Durability for 3M Product Performance, in Years*

**(1) Warranted Durability Table for 3M Product Performance Only in a Standard U.S. Vertical Exposure**

Film	Graphic Protection	Vehicle, Outdoor, Indoor	Inks and Printers
IJ3650-10 IJ3650-114	8518 8519 8520 8915 1920DR 9720UV 9720i	2	See the <i>3M Performance Guarantee Printer and Ink Matrix</i> at 3Mgraphics.com, under Warranties

**E. General Warranty Stipulations for 3M™ MCS™ Warranty and 3M Performance Guarantee**

These stipulations apply to both the 3M™ MCS™ Warranty and 3M Performance Guarantee. General provisions for these stipulations are covered in the *3M Graphics Market Center Warranty Brochure* at 3Mgraphics.com.

**(1) Reduced Warranted Durability for Non-vertical Graphics**

For graphics oriented in a non-vertical, outdoor exposure, multiply the warranted durability years for your graphic construction as shown in the applicable Warranted Durability Tables, Section C.(1) or Section D(1), by the percentage shown for the intended graphic exposure.

<b>If the Graphic Exposure is:</b>	<b>Use this Percentage of U.S. Vertical Exposure, Warranted Durability</b>	<b>Calculation Examples</b>
U.S. Non-vertical	0	0
Desert Southwest Vertical	70% (0.7)	0.7 x 6 years = 4.2 years 0.7 x 2 years = 1.4 years
Desert Southwest Non-vertical	0	0
Horizontal	0%	0

**(2) 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.

**(3) Application Outside the U.S.**

Contact the 3M organization for that country.

**(4) Application to Glass**

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

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

The 3M™ MCS™ Warranty does not cover finished graphics made with inks, film, graphic protection and/or application tapes that are not sold or recommended by 3M. The user is solely responsible for the graphic appearance, performance and durability of graphic constructions that include any other products.

The 3M Performance Guarantee covers selected 3M branded graphics products when used with qualified Inks and Printers. See the *3M Performance Guarantee Printer and Ink Matrix* at [www.3Mgraphics.com](http://www.3Mgraphics.com).

**7. Factors that Affect Graphic Performance Life**

The actual performance life of a graphic is affected by all of the following.

- The combination of graphics materials used
- 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

**8. Graphics Manufacturing**



Before using any equipment, always follow the manufacturers' instructions for safe operation.

**A. Inkjet Ink**

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

**(1) Backlit Signs Require Special Consideration**

Clear films (color -114) tend to be more sensitive to shrinkage due to high total ink coverage. Film that is not completely dried prior to creating an overlap may shrink and result in a light leak. Rather than increasing the total ink coverage to increase the density of the backlit image, we recommend printing two layers of film at lower ink levels. Refer to Instruction Bulletin 4.26 for details and construction options.

### (2) Total Ink Coverage

The maximum recommended total ink coverage for this film is:

**270%** when printed with all approved 3M inkjet solvent inks.

**280%** when printed with all approved 3M inkjet UV inks and latex inks.

**250%** when printed on the Mimaki JV5 Series printer with HS ink series (3M Performance Guarantee).

Too high a total physical ink amount on the film results in media characteristic changes, incomplete drying, overlamine lifting, and/or poor graphic performance. Refer to the Instruction Bulletin for the ink system being used for additional details about total ink coverage.

### (3) Completely Dry Graphics

#### **Important Note!**

Incomplete drying can result in graphic failure including curling, increased shrinkage and adhesion failure, which are not covered under warranty.

Always build enough time into your process to ensure complete drying of the graphic. Poorly dried film may become soft and stretchy, and the adhesive may become too aggressive. This can cause difficulty when applying an overlaminate, rolling the graphic, and applying the film. See the ink's Instruction Bulletin for more details.

## **B. Graphic Protection**

Graphic protection can improve the appearance, performance and durability of your graphic.

- Clear 8530 must be applied with a liquid laminator.
- Overlaminates must be cold roll applied.

## **C. Cutting**

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

- Bandsawing
- Hot kiss cutting
- Drum-type electronic cutting
- Flat-bed electronic cutting
- Guillotine
- Hand cut
- Cold and hot steel-rule die cutting

The following minimum values for cutting text from this film are based on upper case Helvetica medium type. Weeding is much more difficult with smaller text.

- Minimum stroke width: 0.19 inch (4.76 mm)
- Minimum height: 1.0 inch (25.4 mm)
- Minimum radius for end of stripe: 0.024 inch (0.6 mm)

## **D. Application Tapes**

### (1) When to Use Premasking Tape

- As an application aid to increase stiffness, and prevent stretching and damage during application.
- When little or no liner is exposed.

### (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 the film elements. Then locate the graphic protection on your graphic in the table below, and use the corresponding tape. See Instruction Bulletin 4.3 for complete details.

**EXAMPLE:** If the film is protected by overlaminate 8519 and you want to premask the film, use premasking tape SCPM-3.

*Continued on the next page.*

**Graphic Protection** Refer to the Warranty tables to determine what graphic protection is approved for your graphic construction.

Application Tape	None	3619, 3620 8518, 8519, 8520, 8915	8908 8909	8530	1920DR	9720i 9720UV
Premasking SCPM-3	■ <sup>1</sup>	■	■	■	■	—
Prespacing SCPS-2	■ <sup>1</sup>	■	■	—	—	—
Premasking SCPM-44X	■ <sup>2</sup>	—	—	—	—	■
Prespacing Tape SCPS-53X	■ <sup>2</sup>	—	—	—	—	■

— = Prespacing and/or premasking it not recommended when using this graphic protection option.

1. All solvent inks.

2. All UV inks.

## 9. Application and Installation

Refer to the 3M Related Literature section for a list of the Instruction Bulletins that may be needed to apply or install this film.

### A. Finishing

This film does not require edge sealing. However, applications such as cut graphics, may benefit from using 3M edge sealer 3950.

### B. Cleaning Graphics

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 for general maintenance and cleaning information.

## 10. Health and Safety



### CAUTION

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

## 11. Shelf Life, Storage and Shipping

### A. Shelf Life

**Total shelf life: 3 years** from the date of manufacture on the original box. Up to 3 years unprocessed, **OR** process within 2 years **and** then apply within 1 year of processing.

### 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, or rolled printed side out on 6 inch (15 cm) or larger core. This helps prevent the liner and, if used, the application tape from popping off.

## 12. 3M Related Literature

Before starting any job, be sure you have the most current Product and Instruction Bulletins.

The information in 3M Product and Instruction Bulletins is subject to change. Current Bulletins are available at 3Mgraphics.com. The following applicable Bulletins provide information and processes you need to properly make the graphics described in this Bulletin. Additional Bulletins may be needed as indicated in the 3M Related Literature section of other 3M components you use.

Bulletin types: PB = Product Bulletin; PB-IB = Product & Instruction Bulletin; IB = Instruction Bulletin

Subject	Type	Bulletin No.
3M™ Piezo Inkjet Ink Series 1500v2	PB-IB	1500
3M™ Piezo Inkjet Ink Series 4400	PB-IB	4400
3M™ Piezo Inkjet Ink Series 4800	PB-IB	4800
3M™ Piezo Inkjet Ink Series 5500	PB-IB	5500
3M™ Piezo Inkjet Ink Series 2200UV	PB-IB	2200UV
3M™ Piezo Inkjet Ink Series 6200	PB-IB	6200
3M™ Piezo Inkjet Ink Series 2600UVv2	PB-IB	2600UV
3M™ Piezo Inkjet Ink Series 2700UV	PB-IB	2700UV
3M™ Piezo Inkjet Ink Series 2800UV	PB-IB	2800UV
3M™ Piezo Inkjet Ink Series 5400UV	PB-IB	5400UV
Mimaki Ink Series LF-200	PB-IB	LF200
3M Graphic Protection Products	PB	GP-1
3M™ Screen Print Gloss Clear 1920DR - Applying screen printing clear 1920DR	PB IB	1900 3.12
3M™ Screen Print Gloss Clear 9720UV and Matte Clear 9730UV, and UV Gloss Clear 9720i	PB-IB	Clears 9720
Scoring and cutting	IB	4.1
Cold roll lamination	IB	4.22
Using 3M application tapes; premasking and prespacing for films	IB	4.3
Making backlit signs with 3M digitally imaged graphics	IB	4.26
Application, substrate selection, preparation and substrate-specific application techniques	IB	5.1
Application, general procedures for indoor and outdoor dry applications	IB	5.5
Storage, handling, maintenance, removal	IB	6.5
3M Graphics Market Center Warranty Brochure		go to <a href="http://www.3Mgraphics.com">www.3Mgraphics.com</a>

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## 13. Bulletin Change Summary

New Compatible Products: Overlaminates 8518 and 8915; HP Designjet L65500 and Scitex LX600 & LX800 with HP 3M LX600 Specialty Latex inks; Agfa :Jeti 3318 printer for ink series 6200. Discontinued Products: Ink series 4600, 6000 and 6800. Film RG3650-114 is available for purchase and use with only a 3M Basic Product Warranty on a customer test and approve basis.



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