



Scotchcal™

Graphic Film Series IJ3650, Film RG3650-114 and Film FN3650-114

For Piezo Ink Jet Printing Only

Description

3M™ Scotchcal™ Graphic Film Series IJ3650, 3M™ Scotchcal™ Graphic Film RG3650-114 and 3M™ Scotchcal™ Graphic Film FN3650-114 are piezo ink jet printable, 2 mil films with a pressure-sensitive adhesive. These films are an excellent choice for permanent, medium-term graphics and signs.

Recommended Types of Graphics and End Uses

These types of graphics and end uses may be warranted by the 3M™ MCS™ Warranty. Please read the entire bulletin for details. A Performance Guarantee is also offered for film IJ3650-114; see page 4 for details.

- Film IJ3650-114, RG3650-114 and FN3650-114 (transparent), single panel, vertical graphics for:
 - Indoor and outdoor translucent graphics and signs for windows
 - Two way graphics
 - Backlit graphics
- Film IJ3650-10 (white), single panel, vertical graphics for:
 - Indoor and outdoor opaque graphics, signs and markings

Limitations of End 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

- 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

- Graphics made for automotive Original Equipment Manufacturers (OEM); contact 3M Automotive Division at 1-800-328-1684 for alternatives.
- 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.



Caution

Some states have laws or regulations requiring minimum light passage that may limit or preclude the use of transparent film IJ3650-114, FN3650-114 or RG3650-114 on vehicle windows. The user is responsible for determining and complying with all applicable standards.

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.

Compatible Products for 3M™ MCS™ Warranted Graphics

Inks and Printers for Film Series IJ3650

This film is forward wound on a 3-inch unnotched core.

- 3M™ Piezo Ink Jet Ink Series 1500
 - VUTEk UltraVu™ 150 Printer
 - VUTEk UltraVu™ 2360/3360 Printers
 - VUTEk UltraVu™ 3300/5300 Printers
- 3M™ Piezo Ink Jet Ink Series 2600UV
 - 3M™ Printer 2500UV
- 3M™ Piezo Ink Jet Ink Series 6000
 - Océ Arizona 30s Printer

Order films for the Scitex printer on a forward wound 6-inch unnotched core.

- 3M™ Piezo Ink Jet Ink Series 4600
 - Scitex Pressjet-W™ Printer

Continued on the next page.

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

Inks and Printers for Film RG3650-114

This film is reverse wound on a 3-inch, 4-notch core.

- 3M™ Piezo Ink Jet Ink Series 6800
 - Océ Arizona 180 Printer
 - Océ Arizona 90 Printer

Inks and Printers for Film FN3650-114

This film is forward wound on a 3-inch, 4-notch core.

- 3M™ Piezo Ink Jet Ink Series 5500
 - Océ Arizona 600 Printer

Graphic Protection Options

- 3M™ Scotchcal Luster Overlaminates 8519
- 3M™ Scotchcal Matte Overlaminates 8520
- 3M™ Scotchcal Luster Overlaminates 8908
- 3M™ Scotchcal Matte Overlaminates 8909
- 3M™ Screen Print Gloss Clear 1920DR
- 3M™ Screen Print Gloss Clear 9720UV

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

Characteristics

All values given are typical for unprocessed film unless noted otherwise and are not for use in specifications. Processing film may change certain values. If you have questions about your construction, contact the Technical Service helpline at 1-800-328-3908.

Physical Characteristics

Characteristic	Description
Film	Vinyl
Colors	IJ3650-10 White IJ3650-114 Transparent RG3650-114 Transparent FN3650-114 Transparent
Thickness	Without adhesive: 2 mils (0.05 mm) With adhesive: 3 to 4 mil (0.08 to 0.1 mm)
Adhesive type	Pressure sensitive
Adhesive color	Gray
Liner	Polyethylene-coated paper

Characteristic	Description
Tensile strength	5 pounds/inch at 73°F (0.9 kg/cm at 23°C) (minimum)
Liner	Polyethylene-coated paper
Adhesion <i>24 hours after application</i>	ABS, Acrylic enamel, Fruehauf pre-painted panels: 4 pounds/inch (0.7 kg/cm) Aluminum, anodized: 8 pounds/inch (1.4 kg/cm) Chrome: 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

Application Characteristics

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

Warranty Information

Graphic Performance Life

The actual performance depends on the:

- Use of 3M compatible products and recommended printers
- Correct combination of film, ink and graphic protection (if required)
- Adequate ink drying
- Selection and preparation of the substrate
- Surface texture
- Application methods
- Angle and direction of sun exposure
- Environmental conditions
- Cleaning or maintenance methods

Continued on the next page.

Note: For the full product names of the 3M products listed on this page, please see pages 1 and 2.

3M™ MCS™ Warranted Graphic Constructions

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

The warranties in this table are for graphics exposed in the U.S. in a vertical orientation. See **Warranty Notes** for how to determine other warranty combinations.

Warranted Durability			
Construction		U.S. Vertical Exposure (in years)	
Ink Series	Graphic Protection	Outdoor	Indoor
Film IJ3650-10 plus...			
1500 4600	None	3	3
	8519 8520 1920DR 9720UV	4	8
	8908 8909	1	3
Film IJ3650-114, RG3650-114, or FN3650-114 plus...			
1500 2600UV 4600 5500 6000 6800	None	3	3
	8519 8520 1920DR 9720UV	4	8
	8908 8909	1	3

Warranty Notes

Graphic Exposure Definition



face of graphic

Vertical Exposure

The face of the graphic is $\pm 10^\circ$ from vertical.

How to Determine U.S. Desert Southwest Warranties

All other outdoor warranties are based on a percentage of the vertical U.S. warranties given in the Warranted Durability Table. The calculation for determining these warranties is given below. A “construction” is the base film, inks and clear or overlaminate (if required). The examples are based on a vertical U.S. warranty of 4 years.

- **Warranty for U.S. Desert Southwest Exposure**

For graphics exposed to solar energy more than half of the time in Arizona, New Mexico and the desert areas of California, Nevada, Utah and Texas. A detailed map is available upon request.

- **Vertical U.S. Desert Southwest**

70% (0.7) of the U.S. vertical warranty for your construction

Example: 0.7 x 4 years = 2.8 years

Application Outside the U.S.

Contact the 3M organization for that country.

Graphics Made with Components Not Sold or Recommended by 3M

The user is solely responsible for the graphic appearance, performance and durability when this film is used with any other manufacturers’ inks, overlaminates and/or application tapes. See *Performance Guarantee for other options*.

Clears

Clears 1920DR and 9720UV must be applied by screen printing. Clear 9720UV must also be cured. For details, refer to the Product and Instruction Bulletins for the screen print clear being used.

Other Overlaminates

Overlaminates must be squeeze roll applied using 3M authorized laminators and processes.

Application to Glass

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

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 IJ3650 and films RG3650-114 and FN3650-114 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. 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 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 materials charges.

Note: For the full product names of the 3M products listed on this page, please see pages 1 and 2.

3M Performance Guarantee

The 3M Performance Guarantee covers only product performance of 3M films and the required 3M graphic protection product when used with the printers and OEM inks listed in this table for the types of graphics, construction methods and application techniques specified in the base film's 3M Product Bulletin and related Instruction Bulletins. This is not a finished graphics warranty. The sole remedy is the replacement cost of 3M films and graphic protection product used in the construction for the durability term. See the Performance Guarantee details at www.Scotchprint.com.

Performance Guarantee		
Film IJ3650-114 <i>with graphic protection 8519, 8520, 1920DR or 9720UV</i>		U.S. Vertical Exposure
Printer	Ink Series	Outdoor Signs Indoor Signs
Mimaki JV 3 Series	MS, SS, S2	2 years
Mutoh Falcon II Outdoor	Eco-Solvent Plus™	
Oce CS6060	Oce IJC610	
Roland SOLJET Pro II Ex Series	Roland Eco-SOL	
Seiko ColorPainter™ 64S	EG-Outdoor	

Total Ink Coverage for Performance Guarantee Constructions

We recommend a maximum total ink coverage of 270%. Make sure that the ink lay down is within the limits of what the drier can handle to prevent ink smearing.

Printer Support Information

Ink

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

Total Ink Coverage

Do not exceed the recommended total ink coverage for this film. Too high a total physical ink amount on the film results in media characteristic changes, inadequate drying, overlamine lifting, and/or poor graphic performance. Refer to the Instruction Bulletin for the 3M ink system being used for the recommended total ink coverages.

Backlit Signs Require Special Consideration

Clear films IJ3650-114, RG3650-114 and FN3650-114 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. 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.

Color Profiles

Many color profiles are available on our website at www.scotchprint.com.

Drying

Caution

Always build enough time into your process to ensure adequate 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 overlamine, rolling the graphic, and applying the film. See the ink's Instruction Bulletin for more details.

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)

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

Application Tapes

The type of application tape to use depends on the type of graphic produced and the ink, overlamine or screen print clear that was applied last. See Instruction Bulletin 4.3 for details.

Ink Series	Graphic Protection	Prespacing Tape	Premasking Tape
1500 4600 5500 6000 6800	8908 8909	None	SCPM-3
	None 1920DR 8519 8520	SCPS-2	SCPM-3
All inks	9720UV	SCPS-53X	SCPM-44X
2600UV	1920DR 8519 8520	SCPS-2	SCPM-3
	None	SCPS-53X	SCPM-44X

Fabrication

Refer to the **3M Related Literature** section for a list of the Product and Instruction Bulletins that may be needed to make a graphic.

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.

Edge sealer 3950 may be used, if needed.

Maintenance and Cleaning


Use a mild cleaner such as the kind used 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). See Instruction Bulletin 6.5.

Shelf Life, Storage and Shipping

Activity	Recommendation
Shelf life	Total shelf life: 2 years Up to 2 years unprocessed, OR process within 1 year and apply within 1 year of processing
Storage conditions	<ul style="list-style-type: none"> • 100°F (38°C) maximum • Out of sunlight • Clean dry area • Original container
Shipping finished graphics	Flat, or rolled printed side out on 5 inch (13 cm) or larger core; processed film may block if wound too tightly

See Instruction Bulletin 6.5 for details.

Health and Safety

 Caution
<p>When handling any chemical products, read the manufacturers' container labels and the Material Safety Data Sheets (MSDS) for important health, safety and environmental information.</p> <p>To obtain MSDS sheets for 3M products:</p> <ul style="list-style-type: none"> • 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. <p>When using any equipment, always follow the manufacturers' instructions for safe operation.</p>

Attention:

Authorized Graphics Manufacturers

Visit our password-protected website for exclusive product information, profiles and services. Certain restrictions apply.

1. Go to www.scotchprint.com.
2. Select a country.
3. Click *Login* on upper left side of screen.
4. Click Register.
5. Enter authorization code: **CGD_SGN**.
6. Complete the information and submit.
An e-mail will be sent when your authorization is completed.

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 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.
3M™ Piezo Ink Jet Ink Series 1500	1500	4578
3M™ Piezo Ink Jet Ink Series 2600UV	2600UV	4594
3M™ Piezo Ink Jet Ink Series 4600	4600	4582
3M™ Piezo Ink Jet Ink Series 5500	5500	4592
3M™ Piezo Ink Jet Ink Series 6000	6000	4560
3M™ Piezo Ink Jet Ink Series 6800	6800	4574
3M™ Screen Printing Ink Series 1900	1900	2501
3M™ Screen Printing Ink Series 9700UV	9700	2507
3M™ Scotchcal™ Overlamine 8519 and 8520	8519/ 8520	4524
3M™ Scotchcal™ Luster Overlamine 8908	8908	3554
3M™ Scotchcal™ Matte Overlamine 8909	8909	3565
Instruction Bulletins		
Design of graphics	2.1	5501
Printing with piezo ink jet series 1500	4.45	6545
Printing with piezo ink jet series 2600UV	4.50	6550
Printing with piezo ink jet series 4600	4.43	6543
Printing with piezo ink jet series 5500	4.47	6547
Printing with piezo ink jet ink series 6000	4.39	6539
Printing with piezo ink jet series 6800	4.40	6540
Screen printing with ink series 1900	3.11	6011

Subject	Bulletin No.	FOD No.
Screen printing with ink series 9700 UV	3.4	6004
Making backlit signs with digitally imaged graphics	4.26	6526
Cold roll lamination	4.22	6522
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, general procedures for interior and outdoor dry applications	5.5	7005
Storage, handling, maintenance, removal	6.5	8505
Warranties		
Worldwide 3M™ MCS™ Warranty		9503

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Bulletin Change Summary

For our Performance Guarantee program, we are continually testing popular piezo ink jet printers and inks with our graphic films to identify those that meet our standards and ensure satisfactory results for your applications. Please refer to the 3M Performance Guarantee table on page 4 to determine the most current approved printers and inks for this film.



Graphics Market Center

3M Center, Building 220-12E-04
PO Box 33220
St. Paul, MN 55144-3220 USA
General Info. 1-800-374-6772
Technical Info. 1-800-328-3908
Fax 1-651-736-4233

Fax-on-Demand 1-800-364-0768 US/Canada or 1-651-732-6506 International
Fax-on-Demand document: 4544
www.scotchprint.com

3M Canada

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1-800-265-1840
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