

Commercial Solutions Division

3M™ Exterior Aircraft Graphic Film A7706

For Unprinted, Screen Printing and UV Inkjet Printing Only

Product Bulletin

1. Product Description

- A. Product Features
- 0.05 mm (2 mil), white polyester film, available in perforated or non-perforated film
 - Medium-term, exterior durability
 - Durable, dimensionally stable
 - Good resistance to water, Mil-L-7808 oil, and Jet A fuel
 - Designed for flat surfaces with or without flush rivets (raised, bead rivets must be cut around) and simple curved surfaces
 - Adheres to properly cleaned aluminum that is bare, primed or painted
 - Easily cleaned with common cleaning solutions
 - Permanent
 - Covered by the Specific Warranty for 3M™ Exterior Aircraft Graphic Films
- B. Recommended Types of Graphics and End Uses
- 3M™ Exterior Aircraft Graphic Film A7706 is intended only for use with the listed Compatible Products and the following applications. Any other application is NOT warranted by 3M or covered by the Specific Warranty for 3M™ Exterior Aircraft Graphic Films as provided on page 7.
- Multicolor graphics for aircraft graphics
 - Aircraft signage
 - Aircraft identification graphics
 - Aircraft labels
- C. Limitations of End Uses
- The sale of exterior aircraft graphic film is restricted to qualified parties. Please contact 3M Technical Service for the country in which the customer is purchasing the material for details.
 - Contact your local 3M Technical Service if you have any questions before fabricating, applying, maintaining or removing this film.



WARNING

Serious product failure, such as the graphics lifting off the surface, can result if the product is used on surfaces for which it is not intended, or if it is improperly applied or maned.

3M has identified certain limitations for graphic film A7706, which does not imply that all other applications are safe or will provide acceptable performance.

- This film is only for exterior aircraft graphics. However, the aircraft operator is responsible for determining if installing this product requires regulatory approval from the operator's authorizing agent or appropriate aviation authorities.
- The use of graphic films on aircraft can alternatively be realized by qualifying a concept with the local aircraft homologation authorities. Usually an engineering change request procedure must be engaged and completed prior to proceeding with the approved process to apply graphic film onto aircrafts.
For the avoidance of confusion, 3M specifically disclaims any warranty that the product satisfies or is in compliance with any aviation authority regulations.
- Graphics must be edge sealed.
- The end user is responsible for determining the product's suitability for the end user's application.
- Do not use in applications that require conformance to Mil-P-38477A or A-A-59485.
- Do not use this film for:
 - Interior surfaces
 - Glass or other aircraft window surfaces
 - Areas exposed to severe abrasion
- Do not use this film for:
 - Application within 16 inches (406 mm) of leading edges
 - Areas exposed to high operating temperatures above 150°F (+65°C)
 - Surfaces exposed to leaking fluids, such as aviation hydraulic fluid LD-4
 - Extreme, sharply rounded or complex curves
 - Irregular surfaces, unless:
 - o Film is cut and removed around raised, bead-riveted surfaces, hinges, locking mechanisms, seams or other similar uneven surfaces.
 - o Film is cut completely along any seams.
- Do not apply film at less than 50°F (+10°C). Film may not have sufficient adhesion at lower application temperatures. See Application Characteristics, page 3, and Application, page 6, for additional details.

Additional specific information about compatible products can be found in the Product and Instruction Bulletins listed in 3M Related Literature, page 8.

2. Compatible Products

A. Solvent Screen Printing

- 3M™ Screen Printing Ink Series 1900 (Solvent)
- 3M™ Screen Print Gloss Clear 1920DR
- 3M™ Screen Print Matte Clear 1930

B. UV Screen Printing

- 3M™ Screen Printing UV Ink Series 9800
- 3M™ Screen Print UV Gloss Clear 9740i

C. UV Inkjet Printing

- 3M™ Piezo Inkjet Ink Series 2200UV
- 3M™ Piezo Inkjet Ink Series 2800UV
- EFI™ VUTEK® GS 3M Premium UV inks
- EFI™ VUTEK® GSr 3M Premium UV inks
- EFI™ VUTEK® GSLXr 3M™ SuperFlex UV Ink (excludes White Ink)
- EFI R3225 3M UV Ink
- Mimaki LF-200 ink series (Manufactured by 3M)
- Mimaki UV Ink LUS-200 (Manufactured by 3M)
- 3M™ Screen Print UV Gloss Clear 9740i
- EFI™ VUTEK® PV200 Printer
- Durst Rho 160R and 351 Printers
- EFI™ VUTEK® QS2000, QS3200, QS3220, QS2220 Printers
- EFI™ VUTEK® GS2000, GS3200 and GS3250 Printers
- EFI™ VUTEK® GS3250r and GS5000r Printers
- EFI™ VUTEK® GS3250LXr Pro Printer
- EFI R3225 UV Roll-to-Roll Printers
- Mimaki UJV-160, JFX-1631 and 1615R Printers
- Mimaki UJV500-160 Printer

D. Other Products

- 3M™ Prespacing Tape SCPS-2
- 3M™ Prespacing Tape SCPS-53X
- 3M™ Prespacing Tape SCPS-100
- 3M™ Premasking Tape SCPM-3
- 3M™ Premasking Tape SCPM-19
- 3M™ Premasking Tape SCPM-44X
- 3M™ Edge Sealer 4150S
- 3M™ Edge Sealer ES2000

Note: Other edge sealers may be used on a customer test-and-approve basis. Problems attributed to such test-and-approved materials are not covered by the 3M Warranty.

3. Characteristics

These are typical values for unprocessed product; processing may change the values.

A. Physical Characteristics

Characteristic	Value		
Film material	Polyester, white		
Film thickness	Without adhesive: 2 mil (0.05 mm) With adhesive: 4 mil (0.10 mm)		
Adhesive	Clear, pressure sensitive		
Liner	96 pound, polyethylene coated paper		
Tensile strength of non-perforated film at 73°F (+23°C)	45 pound/inch [MD] (200 N/25 mm [MD]) 60 pound/inch [CD] (265 N/25 mm [CD]) Perforations in the film may reduce this property		
Chemical resistance Unprinted film was applied to an aluminum substrate at 73°F (+23°C) and conditioned at 73°F (+23°C) for 24 hours. <i>* Sample edge sealed with edge sealer 4150S.</i>	Chemical	Exposure Time	Results
	Water	8 hours at 73°F (+23°C)	No effect
	Mil-L-7808 oil*	24 hours at 73°F (+23°C)	Slight gloss loss; less than 1/8 inch (3 mm) edge attack
	Jet A fuel	1 hour	Slight edge attack
	Hydraulic fluid, LD-4*	1 hour	Top coat dissolves; base film remains intact; edge sealer dissolves

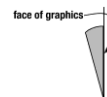
B. Application Characteristics

Characteristic	Value
Application surfaces	Flat surfaces with or without flush rivets; simple curves
Application substrates	Aluminum: bare, primed, or painted
Application temperature range	50 to 100°F (+10 to +38°C) (air and substrate)
Applied shrinkage	0.015 inch (0.4 mm)
Adhesion after 24 hours	Aluminum: 5 pound/inch (22 N/25 mm) Primer: 3.6 pound/inch (16 N/25 mm) Paint: 4.0 pound/inch (17 N/25 mm)
Removal	Permanent film

4. Definitions

A. Exposure Types

Vertical:



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

B. Finished Graphic

A graphic that has been applied to the intended substrate and is considered fully finished.

C. Graphic Construction

The products used to make a graphic, which may include film, graphic protection, ink, printer and application tape.

6. Warranty Information

A. Warranty Coverage Overview

Both the warranty coverage and durability for each graphic are based on the user(s) reading and following all applicable and current 3M Product and Instruction Bulletins. 3M will honor the Warranty Period stated in the Warranty Period Table in the version of this Product Bulletin that is current when the film was purchased.

B. Warranty Period Subject to Stipulations set forth in Section C., below

Finished graphics constructed with the materials specified and used as recommended are eligible for the Specific Warranty for 3M™ Exterior Aircraft Graphic Films. See the terms of this warranty on page 6.

(1) Warranty Period Table for Finished Graphics in a Standard Vertical Exposure

Graphic Construction			Edge Sealer	Warranty Period
Printing Method	Ink/Toner	Clear Coat		
None	None	None	4150S ES2000	3 years
Solvent Screen Print	Ink Series 1900 (Solvent)	1920DR 1930	4150S or ES2000	3 years
UV Screen Print	Ink Series 9800 (UV)	9740i	ES2000	3 years
UV Inkjet	Series 2200UV, 2800UV, GS, GSr, GSLXr, R3225, LF- 200, LUS-200	9740i	ES2000	3 years

C. General Warranty Stipulations

These stipulations apply to graphics covered by the Specific Warranty for 3M™ Exterior Aircraft Graphic Films.

(1) 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.

(2) Application to Aircraft Windows

3M does not support applications of this film to aircraft windows. 3M accepts no liability for damage if this film is used on window graphics.

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

The 3M Warranty does not, under any circumstances, cover graphics made with inks, film, graphic protection, edge sealers 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 non-recommended or qualified products.

(4) Graphic Protection

Clear 1930 may haze, which is not warranted.

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

- Correct combination of 3M-recommended graphics products
- Screen printing Ink formulations
- Proper drying and curing of the inks and clears
- Selection, condition and preparation of the substrate
- Surface texture
- Application and finishing methods
- Angle and direction of sun exposure
- Environmental conditions
- Cleaning or maintenance method.

7. Factors that Affect Graphic Performance Life

8. Graphics Manufacturing



- A. Screen
- B. Printing

To get the durability given in the Warranty Period, use the recommended combination of ink, clear coat and edge sealer. Carefully follow the processing directions.

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

Use the 3M screen print inks and the required 3M clear coat as listed in Compatible Products, page 2. For further information about these products, click on the blue underlined links in Compatible Products.

- C. Inkjet Printing

Film A7706 may be inkjet printed with the inks listed in the Compatible Products on page 2. A clear coat is required. Check the appropriate Product and Instruction Bulletins.

- (1) Total Ink Coverage

280%: Maximum recommended total ink coverage when printed with 3M UV inkjet inks.

Do not exceed the recommended total ink coverage for the ink series used on this film.

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

- (2) Cure graphics

Use the cure settings recommended by the printer manufacturer. Also review and consider the recommendations in the 3M Product-Instruction Bulletin for the ink and clear you are using, if one is published.

- D. Cutting Methods

The following are common cutting methods for this film.

- Bandsawing
- Hot kiss
- Flat-bed electronic
- Guillotine
- Hand cut
- Cold and hot steel rule
- Knifeless™ Tape, 3M recommends using this product with this film.

- E. Application Tapes

If the Top Layer of the Graphic is:	Use a prespace tape if the graphic has large amounts of exposed liner.	Use a premask tape if very little of the liner is exposed.
None (unprinted film)	SCPS-2 SCPS-100*	SCPM-3 SCPM-19*
1920DR 1930	SCPS-2 SCPS-100*	SCPM-3 SCPM-19*
9740i	SCPS-53X	SCPM-44X

- 9. Application



Film A7706 must be applied according to Instruction Bulletin 5.27. Improper application or maintenance may result in a serious product failure, including the graphics lifting off the surface, and voids any warranty

- This film must be edge sealed to protect it from serious in-flight abrasion. Edge sealing also helps to reduce the attack of fluids on the film. Use edge sealer 4150S or ES2000.
- Do not apply the film if the air or surface temperature is higher than 100°F (+38°C) or lower than 50°F (+10°C).
- Because of its construction, this film will tent when applied over raised rivets and bridge when applied over seams. To prevent film failure, which may include cracking, erosion and/or lifting, use these techniques when you are covering raised rivets or bridging seams:
 - Cut completely around raised rivets and remove the film from the top of the rivet. If desired, you may paint the top of the rivet to complement the graphic.
 - Cut completely along film that bridges seams.
 - Always re-squeegee the film around the cut edge.

In addition to other Bulletins specified in this document, the following Bulletins provide details that you may need to successfully apply a graphic.

10. Maintenance

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.)

11. Removal

Film A7706 has an aggressive, pressure-sensitive adhesive making it difficult to remove from a substrate. Removal may cause damage to the substrate, which is not covered by 3M Warranty. A solvent-based adhesive remover system or steam heat may ease removal. Refer to Instruction Bulletin 5.27 for removal techniques.

12. Shelf Life, Storage and Shipping

A. Shelf Life

Total shelf life: 3 years from the date of manufacture on the original box. If you do process the film, do so within 2 years and apply within 1 year. If you do not process the film, apply it within 3 years.

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 inches (15 cm) or larger core. This helps prevent the application tape, if used, from popping off.

13. 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 with any equipment, call your local Technical Service and always follow the manufacturers' instructions for safe operation.

14. Specific Warranty for 3M™ Exterior Aircraft Graphic Films

A. Warranty Coverage (1) To Whom the Warranty Is Made

3M exterior aircraft graphic films are covered only by this warranty in this Product Bulletin. Do not refer to 3M Commercial Graphics Warranty brochure.

Individual Product Limited Warranty

3M warrants to the Purchaser and End User the compatibility and performance of the 3M graphic products recommended in this Bulletin and used in the manufacture of the finished graphics when they are processed and applied according to applicable 3M Instruction Bulletins.

Finished Graphic Limited Warranty

3M further warrants to the End User that when graphics are made using exclusively 3M graphics products recommended in the Bulletin, 3M will honor all warranties extended to the Distributor or Graphics Manufacturer who sold or produced the graphics as described in the applicable 3M Product and Instruction Bulletins in effect at the time of the product purchase.

This warranty shall be forfeited if the graphics manufacturer substitutes materials not of 3M manufacture or makes unauthorized alterations to 3M materials. Problems that may be reasonably attributed to such actions are not covered by the 3M Warranty.

(2) Defect Coverage

Product Defect Coverage

- Manufacturing Defects. Visual and adhesive defects.
- Physical Defects. Defects incurred during manufacturing, packaging or shipment.
- Graphic Production Defects. Problems in printing, such as artifacts and misprints, clear coating and drying, or premasking.
- Cutting Defects. Clean cutting and weeding characteristics when cut as recommended in the applicable Product Bulletin.
- Premature Failure. Failure due to fading, discoloration, crazing, peeling, blistering, excessive dimensional change beyond normal wear and tear.

Finished Graphic Appearance Defect Coverage

Graphics manufactured using 3M Commercial Graphics products are warranted to retain acceptable appearance for their intended use for the Warranty Period stated on page 3 when viewed from normal viewing distance. As graphics age and are subjected to natural weathering, there can be a gradual reduction in gloss, slight color changes, a slight amount of lifting at edges or around rivets, a slight amount of leading edge erosion and, ultimately, development of a minor amount of cracking which will not materially detract from appearance. These changes are not evidence of a failure, but are normal consequences of weathering and are not covered by warranty.

(3) Use of Defect Product

It shall be the graphic manufacturer's responsibility to immediately cease using what is perceived to be defective product.

B. Limited Remedy

Upon timely notification and 3M'S CONFIRMATION OF A VALID WARRANTY, 3M's sole responsibility, and Purchaser and user's exclusive remedy, shall be at 3M's option either (1) full refund of the purchase price, or (2) full replacement of all 3M products consumed in the manufacture of the graphics.

C. Limitation on Warranty Coverage: Misuse and Force Majeure

3M has no obligations under this warranty with respect to products that have been modified or damaged through misuse, abuse, accident, neglect or mishandling by Purchaser or Purchasers' customer. For example, graphics are not warranted against ink or clear coat damage or removal, base film damage, corrosion, swelling or lifting, or staining caused by chemical or physical means such as, but not limited to, vandalism (such as slashing, deliberate peeling of graphic, penetration by sharp object, gunfire), cleaning solutions, paints, solvents, other strong chemicals, improperly used high pressure washing equipment, mechanical washing equipment which might subject the graphics to frequent, vigorous abrasive scouring action, spills of engine fuels, engine exhaust, steam, organic solvents or other spilled chemicals. Graphics applied to unsound surfaces or to surfaces which subsequently crack, peel, delaminate, outgas, or become damaged beneath the graphics are not warranted for performance. Damage from fire, structural failure, lightning, and other force majeure events are not covered.

15. Disclaimer of Warranty and Important Notice

3M MAKES NO FURTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, 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. User is a sophisticated purchaser and responsible for determining whether the 3M product is fit for its particular purpose and suitable for user's method of application. Many factors can affect the use and performance of this 3M product in a particular application. The materials to which the product will be adhered, the surface preparation of those materials, the product selected for use, the conditions in which the product is used, and the time and environmental conditions in which the product is expected to perform are among the many factors that can affect the use and performance of a 3M product. Given these variety of factors, many of which are uniquely within the user's knowledge and control, it is essential that the user evaluate the 3M product to determine whether it is fit for a particular purpose and suitable for the user's method of application.

16. Limitation of Liability

Except where prohibited by law, 3M SHALL NOT UNDER ANY CIRCUMSTANCES BE LIABLE TO PURCHASER OR USER FOR ANY DIRECT (EXCEPT FOR THE LIMITED REMEDY PROVIDED ABOVE), INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, LOSS OF PROFITS, REVENUE, BUSINESS, OPPORTUNITY, OR GOODWILL) RESULTING FROM OR IN ANY WAY RELATED TO SELLER'S 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 including breach of contract, breach of warranty, negligence, strict liability, or any other legal or equitable theory.

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