



Controltac™ Plus

Graphic Film with Comply™ Adhesive

Series 160C

For Screen Printing Only

Description

Film series 160C, designed for screen printing, are 4-mil films that are removable with heat. The combined features found in Controltac and Comply adhesive technologies, including pressure activation, slideability, repositionability and air release channels, allow for fast and easy, bubble-free graphic installations. These film are ideal for long-term graphics for fleet or commercial vehicles, and indoor or outdoor graphics and signs.

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. Please read the entire bulletin for details.

- Commercial vehicle, transit or fleet graphics, emblems or striping
- Outdoor and indoor graphics and signs
- Vending or dispensing machine and cooler graphics
- Internally-illuminated graphics (film 160C-60 only)
- Small format original equipment manufacturer's (OEM) decorative and identification graphics

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.

Wall Graphics

Two mil cast films are typically the best choice for indoor smooth surface wall graphics, although four mil films may be suitable for shorter term applications. In either case, the user is responsible for determining the product's suitability, including adhesion and, if required, removal characteristics. Due to the wide variability of smooth indoor walls, neither finished graphics nor removal is warranted, even for removable or changeable films. Instruction Bulletin 5.37 provides comprehensive information for the most successful wall graphics film selection and application.

Unsuitable End Uses for This Film

- Graphics applied to:
 - Corrugated or highly-irregular surfaces or sharply raised areas
 - Flexible substrates
 - Non-3M films
 - Substrate surfaces that are not clean and smooth (little or no variation in texture)
 - Paint that is not thoroughly cured or dried
- Film without graphic protection under these conditions:
 - Vehicle graphics
 - Exposure to abrasive conditions, harsh cleaners or chemicals
- Graphic removal from:
 - Applications with poor paint-to-substrate adhesion
 - Wallboard
 - Existing graphics that must remain intact; damage may occur during removal of film
 - Aged paint or metal that may have surface oxidation or chalking
 - Outdoor, horizontal surfaces
- Graphic subjected to gasoline vapors or spills at gas pumps, automobile fuel-tank ports, or top-feeding petroleum tankers
- Graphics made for automotive Original Equipment Manufacturers (OEM); contact 3M Automotive Division at 1-800-328-1684 for alternatives.

Important Information About Bus Applications

Film used on buses must not be applied in a way that restricts the safe use of emergency window exits. See the most recent version of Instruction Bulletin 5.4.

Compatible Products

Refer to the durability tables for 3M MCS warranty for the proper combination of materials and end uses.

3M Screen Printing Inks

- 3M™ Screen Printing Ink Series 1900
line color and four-color
- 3M™ Screen Printing UV Ink Series 9800
line color and four-color

OEM Inks and Clears

- Sericol™ Duracal™ UV Screen Printing Inks*
- Sericol™ Duracal™ Overprint Clear*

*These products are warranted by 3M for use in OEM applications only. See **Screen Printing** section, page 4, for how to obtain Duracal inks.

3M Graphic Protection Options

- 3M™ Screen Printing Gloss Clear 1920DR
- 3M™ Screen Printing Low Gloss Clear 1930
- 3M™ Screen Printing Gloss Clear 9720UV
- 3M™ Screen Printing Low Gloss Clear 9730UV
- 3M™ Screen Printing Gloss Clear 9800CL

Other Products

- 3M™ Edge Sealer 3950
- 3M™ Prespacing Tape SCPS-55
- 3M™ Premasking Tape SCPM-3

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
Material	Vinyl
Color	
Gloss	Matte
Thickness	Without adhesive: 4 mils (0.10 mm) With adhesive: 4.5 –5 mils (0.11-0.13 mm)
Adhesive type	Pressure-activated with air release channels
Adhesive color	Gray
Liner	Polyethylene-coated paper
Tensile strength <i>minimum</i>	13 pounds/inch at 73°F (2.3 kg/cm at 23°C)
Adhesion <i>24 hours after application</i>	Aluminum, anodized: 4.2 pounds/inch (0.74 kg/cm) Fruehauf pre-painted panels: 1.8 pounds/inch (0.32 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: Acrylic, aluminum, glass (uncoated), painted metal, polycarbonate, and painted wood (smooth) Application temperature: 40° to 100°F (4° to 38°C) <i>air and substrate</i> Application method: Dry
Applied film shrinkage	0.032 inch (0.8 mm)
Finished graphic exposure temperature	-30° - +200°F (-34° - +93°C)
Graphic removal	Removable with heat Removal temperature: Minimum ambient and substrate temperature 40°F (4°C)

Warranty Information

See the 3M Graphics Center Warranty Brochure for the complete warranty and remedy details. The warranty given in the Product Bulletin that is current at the time you purchased the film is the one that 3M will honor.

3M™ MCS™ Warranty

for Finished Graphics

3M MCS Warranty Finished Graphic Constructions and Durability									
U.S. Vertical Exposure ONLY (in years)									
Graphic Type	Vehicle	Outdoor	Indoor	Vehicle	Outdoor	Indoor	Vehicle	Outdoor	Indoor
Ink Series	1900			9800 <i>most colors</i>			9800 <i>metallics</i>		
Graphic Protection	Film 160C-30 and 160C-32								
1920DR	5	4	5	—	—	—	—	—	—
1930	2	2	2	—	—	—	—	—	—
9720UV	5	4	5	5	4	5	3	3	3
9730UV	—	—	—	3	3	3	—	—	—
9800CL	—	—	—	5	4	5	3	3	3
None	—	—	—	0	2	2	—	—	—
Ink Series	1900			9800 <i>most colors</i>			9800 <i>metallics</i>		
Graphic Protection	Film 160C-60								
1920DR	4	3	4	—	—	—	—	—	—
1930	2	2	2	—	—	—	—	—	—
9720UV	4	3	4	4	3	4	3	3	3
9730UV	—	—	—	3	3	3	—	—	—
9800CL	—	—	—	4	3	4	3	3	3
None	—	—	—	—	2	2	—	—	—
Ink Series	No Printing			No Printing			Sericol Inks/Clear		
Graphic Protection	Film 160C-30 and 160C-32			Film 160C-60			160C-30 and 160C-32, OEM Small Format		
None	5	4	5	4	3	4	3		

How to Determine Other MCS Warranty Durabilities

Use the warranted durability for your construction if exposed in a U.S. vertical orientation and use the following formulas to determine other durabilities.

	Exposure		
	U.S. Non-Vertical	U.S. Vertical Desert Southwest	U.S. Non-Vertical Desert Southwest
Percentage of U.S. Vertical Exposure	50% (0.5)	70% (0.7)	35% (0.35)
Example	0.5 x 3 years = 1.5 years	0.7 x 3 years = 2.1 years	0.35 x 3 years = 1.05 years

Other Warranties

Warranty Stipulations for Van, Bus, Recreational Vehicles or Automobile ("Vehicle") Paint Refurbishing Reimbursement

A Pre-Installation and Inspection Report (see Instruction Bulletin 5.36), completed prior to graphic installation, must be submitted with any claim for paint damage sustained during the removal of 3M removable or changeable graphic film from vehicles. A separate report for each vehicle involved in the claim is required. A claim cannot be authorized without these reports.

Removal Warranty for 3M MCS Warranty and 3M Performance Guarantee from Standard Vehicle and Sign Substrates

Removal requires heat. The ease and rate of removal depends on a number of factors. See Instruction Bulletin 6.5 for details. Refer to page 1, *Limitations of End Uses, Graphic removal from*, for restrictions.

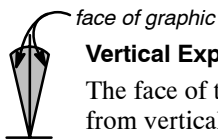
Orientation	Remedy
Vertical	Same as the Warranted Durability
Non-vertical	50% of the U.S. Vertical Warranted Durability

Removal Warranty Exceptions

- This film is not designed for short-term graphics on painted wallboard and may cause damage upon removal from painted surfaces.
- Removal from a pre-existing graphic will damage that graphic.
- Aged paint and metals must be tested to ensure removability. Surface oxidation or chalking may result in adhesive residue upon removal.
- Paint that is not firmly bonded to the substrate may be damaged when removing the film.
- Paint that is not properly cured may prevent the film from being removed.

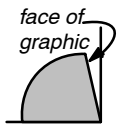
Warranty Notes

Definitions



Vertical Exposure

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



Non-Vertical Exposure

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

Desert Southwest: 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.

Vehicles. Refers to commercial fleet, buses, vans and automobiles unless otherwise noted.

Outdoor. Graphics applied outdoors and exposed to the elements.

Indoor. Graphics applied indoors without direct UV exposure.

Graphic Performance Life

The actual performance depends on the:

- Correct combination of 3M-recommended graphics products
- Ink formulation
- Adequate ink drying and/or UV curing
- Selection and preparation of the substrate
- Surface texture
- Application methods
- Angle and direction of sun exposure
- Environmental conditions
- Cleaning or maintenance methods

Application Outside the U.S.

Contact the 3M organization for that country.

Graphics Made with Components Not Sold or Recommended by 3M

The 3M MCS warranty does not cover finished graphics made with other manufacturers' inks, film, graphic protection and/or application tapes, except as noted in this Bulletin for Sericol inks used in OEM applications. The user is solely responsible for the graphic appearance, performance and durability of graphic constructions that include non-3M graphic products.

Rivets

The film will tent around rivets, which is not covered by any warranty.

Graphic Protection

Any graphic exposed to abrasive conditions (including vehicles), harsh cleaners or chemicals must include graphic protection in order to be warranted.

Clears 1930 and 9730UV may haze, which is not covered by the warranty.

Application to Glass

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

Warranty and Limited Warranty

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: 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. 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 Graphics Market Center Warranty Brochure, which gives the terms, additional limitations of the warranty, if any, and limitations of liability.

Screen Printing

Formulations and processing conditions can affect ink durability. Refer to the Product and Instruction Bulletins for your ink for limitations and proper usage.

Sericol Inks

Sericol's Duracal inks can be obtained through their distribution network. Please refer this web site for details: <http://www.sericol.com/Distributors/distribFR.htm>. You can also contact Sericol at: Sericol Inc. Corporate Office, 1101 W. Cambridge Drive, Kansas City, KS 66103
Tel: 913-342-4060, Fax: 913-342-4752

Printing with Enamel Inks

This film can be printed with typical enamels used for letter press printing and hand brushing, and vinyl inks used in offset printing. The user has sole responsibility for determining the product's suitability and performance characteristics.

Graphic Protection

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

Screen print clears should be applied by standard screen printing methods.

Apply graphic protection to prevent chalking. Unprinted film, which tends to chalk outdoors, is warranted against chalking only when graphic protection is applied. However, chalking may be removed with normal graphic cleaning procedures.

Application Tapes

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

160C	Graphic Protection							
	To determine which of these graphic protection options is approved for your construction, refer to the constructions shown in the 3M MCS Warranty table on page 3.							
	Unprinted	1920DR	1930	Ink Series 9800, no clear	9720UV	9730UV	9800CL	Sericol Duracal Clear
Premasking Tape SCPM-3	■	■	■					
Premasking Tape SCPM-44X				■	■	■	■	■
Prespacing Tape SCPS-55	■	■	■	■	■	■	■	

Application and Installation

Install the film using the dry application method.

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

Adhesive

This film has a pressure-activated adhesive which allows the film to be positioned, slid into place and repositioned easily when only light finger pressure is used. Applying firm pressure, such as with a squeegee, bonds the adhesive to the substrate, and by design, destroys the positionability feature.

The combined features found in Controltac and Comply adhesive technologies, including pressure activation, slide-ability, repositionability and air release channels in the adhesive, allow for fast and easy bubble-free graphic installations. An air bubble trapped under the film can be rubbed out easily and usually does not require making an air release hole. Applying firm pressure bonds the adhesive to the substrate, and by design, destroys the repositionability feature.

The adhesive characteristics may be reduced under these conditions:

- The film has been removed, even partially, from the original liner and reapplied to the same liner or another liner.
- Application at higher than 100°F (38°C) causes the film to lose its repositionability even with only light hand pressure.

Rivets

This film will tent when applied over rivets. If the rivets are closely spaced, the film will bridge between rivets. Tented or bridged film may fail prematurely, which is not covered by any 3M warranty. For the best appearance and durability, 3M recommends cutting around the rivet, removing the circle of film, and then re-squeegeeing around the rivet.

Maintenance and Cleaning

Use cleaning products designed for high-quality painted surfaces. It 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.

Removal


This film can be removed with heat only. No other accessories or chemicals are needed. Most graphics can be removed and leave little or no adhesive residue on the substrate. The ease and rate of removal depends on several factors. See Instruction Bulletin 6.5 for details.

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 • Bring the film to print room temperature before using
Shipping finished graphics	Flat, or rolled printed side out on 5 inch (13 cm) or larger core. These methods help to prevent the liner from wrinkling or popping off the liner.

See Instruction Bulletin 6.5 for details.

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:
<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 www.3M.com/MSDS. • 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.

Attention:

Authorized Graphics Manufacturers

Visit our password-protected website for exclusive product information 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 Product and Instruction 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 appropriate Bulletin(s) that was current at the time you purchased the 3M products. The following Product and/or Instruction 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.
Product Bulletins		
3M™ Screen Printing Ink Series 1900 and Overprint Clear VI0402	1900	2501
3M™ Screen Printing UV Ink Series 9800	9800	2513
3M™ Screen Printing Ink Series 9700UV	9700	2507
Instruction Bulletins		
Screen printing with ink series 9700UV	3.4	6004
Screen printing with ink series 1900 - line color - 4-color	3.12 3.11	6012 6011
Screen printing with UV ink series 9800 - line color - 4-color	3.20 3.21	6020 6021
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, special applications and vehicles	5.4	7004

Subject	Bulletin No.	FOD No.
Application, general procedures for interior and exterior dry applications	5.5	7005
Application: special considerations for complex contours of automobiles, vans and buses and inspection forms	5.36	7036
Applying 3M graphic films with Comply adhesive	5.31	7031
A guide to understanding and applying graphics to common indoor and outdoor wall surfaces	5.37	7037
Storage, handling, maintenance, removal	6.5	7505
Warranties		
3M Graphics Market Center Warranty Brochure		9503

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Bulletin Change Summary

NOTE: Changes made to Release G of this bulletin are shown here as well as Release H changes, which are only to clarify the Warranty Stipulations for removal of graphics from vehicles (see page 3) and to remove an incorrect removeability warranty limitation about horizontal applications.

Change to end use recommendations: Cautionary, safety and vandal-resistant labeling was removed as a recommended or warranted usage.

Updated information about wall graphics. See statement on page 1.

Warranty tables and information has been reorganized for easier usage.

Other changes that do not affect form, fit or function are marked with a black bar in the margin.



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