

Release H, Effective April 2013 (Replaces G, Dec 09) See Bulletin Change Summary at the end of Bulletin

Controltac[™] Graphic Film 181-10

Ideal for Stainless Steel Substrates

For Screen Printing, Electrostatic Imaging and Cut Graphics Only

- 1. Product Description
 - A. Product Features
- 2-mil, white vinyl film
- Specifically formulated for use on stainless steel
- Pressure-activated adhesive for easy sliding, tacking, snap-up and repositioning
- Flexible, conforms to moderate curves, corrugations and rivets
- Permanent film
- B. 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 <u>3MTM MCSTM Warranty</u>. Please read the entire Bulletin for details.

- Indoor and outdoor applications including commercial signs, emblems, labels, markings, striping and graphics for fleet and vehicle, rail cars and recreational equipment
- C. Performance Overview

3M tests the performance of both individual products and finished graphic constructions. This table shows the best performance expected from this product without a Warranty Period and with a Warranty Period.

For detailed graphic construction and application options along with specific Warranty Periods, please see the Warranty Information, Section 5.

Expected Performance Life. This is the estimated period of time the product should perform satisfactorily.					
Unprinted film with no graphic protection, applied to a flat, vertical outdoor surface in a non-abusive environment. 10 years Unwarranted Period					
3MTM MCSTM Warranty. This is the maximum period of time 3M will warrant finished graphic performance.					
Unprinted film with no graphic protection, applied to a flat, vertical rail car surface.	8 years Warranty Period				

D. Limitations of End Uses

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

(1) Unsuitable End Uses for This Product

- Graphics regularly subjected to gasoline vapors or spills
- Graphics applied to stainless steel where the rivets have not been completely cut around.

2. Compatible Products

This section provides a list of products that are approved by 3M for use with the base film covered in this Bulletin, and used for the creation of a graphic that is covered by the 3M[™] MCS[™] Warranty. Refer to the Product and Instruction Bulletins listed in 3M Related Literature at the end of this Bulletin for more information about the compatible products.

See the **Warranty Information** section to determine which compatible products are approved for your graphic construction.

A. 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

- B. Screen Printing Graphic Protection Options
- 3M[™] Screen Print Gloss Clear 1920DR
- 3M[™] Screen Print Low Gloss Clear 1930
- 3M[™] Screen Print Low Gloss Clear 9730UV
- 3M™ Screen Print UV Gloss Clear 9740i
- 3M[™] Screen Print UV Gloss Clear 9800CL
- C. Electrostatic Printing
- Scotchprint® Toner Series 8700/8800
- 3M[™] Trident Transfer Paper
- D. Electrostatic Printing Graphic Protection Options
- 3M[™] Scotchcal[™] Luster Overlaminate 8519
- 3M[™] Scotchcal[™] Matte Overlaminate 8520
- 3MTM ScotchcalTM High Gloss, Graffiti Resistant Overlaminate 8912 *indoor flat surfaces only*
- 3MTM ScotchcalTM Ultra Matte Overlaminate 8915 ES indoor only

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

3. 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	Value
Film	Vinyl
Color	White, opaque
Thickness	Without adhesive: 2 mil (0.05 mm) With adhesive: 3 to 4 mil (0.08 to 0.10 mm)
Adhesive type	Pressure activated (slide, tack, snap up and reposition)
Adhesive color	Gray
Liner	Polyethylene-coated paper
Tensile strength	5 pounds/inch at 73°F (0.9 kg/cm at 23°C) minimum
Chemical resistance	Resists mild alkalis, mild acids, and salt Excellent resistance to water (does not include immersion)

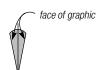
B. Application Characteristics

Characteristic	Value				
Finished graphic application recommendation	Surface type: Flat, with and without rivets; corrugated; simple curves; moderate compound curves Substrate type: Stainless steel; paint (check adhesion to powder-coated or water based paints), ABS resins, fiberglass reinforced plastics, glass and aluminum.				
	Application temperature (air and substrate):				
	50° to 100°F (10° to 38°C) flat surfaces without rivets 55° to 100°F (13° to 38°C) flat, curved or corrugated surfaces with rivets				
Adhesion	Stainless steel: 6 pounds/inch (1.1 kg/cm)				
Temperature range after application	-40° to +200°F (-40° to +93°C)				
Graphic removal	Permanent				

4. Definitions

A. Exposure

U.S. Vertical Exposure



The face of the graphic is \pm 10° from vertical.

U.S. Non-vertical Exposure



The face of the graphic is greater than 10° from vertical and greater than 5° from horizontal. This includes non-vertical surfaces of vehicle wraps or fleet graphics.

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. Click here for a detailed map.

B. Graphic Construction

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

C. Graphic Protection

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

D. 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.

Outdoor Signs Stationary graphics applied outdoors and exposed to the elements.

OEM Labels and decorative graphics produced for and used by original equipment

manufacturers.

Vehicles

Vehicle. Buses, vans, passenger vehicles, delivery trucks, pickup trucks,

enclosed trailers.

Straight Trucks. Semi-Tractors and Semi-Trailers. Straight trucks, semi-tractors and semi-trailers used for commercial business purposes. Excludes air shields.

Recreational Vehicle (RV). Vehicles used for personal pleasure, such as campers, motor homes and trailers, that are not used in connection with any commercial or business enterprise.

Rail. Rail cars and lead cars of trains, light rail and subways, but not locomotives or engines.

5. Warranty Information

A. Warranty Coverage Overview The warranty coverage for each graphic is based on the user(s) both reading and following all applicable and current 3M Product and Instruction Bulletins. 3M will honor the Warranty Period stated in the base film's Product Bulletin that is current when the film was purchased. The Warranty Period 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.

B. 3M Basic Product Warranty

This product is 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 <u>3M Graphics Warranties Brochure</u>.

C. Limited Remedy

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.

D. 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, LABOR, NON-3M MATERIAL CHARGES, 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.

E. Additional Limitations

See the <u>3M Graphics Warranties Brochure</u> at 3Mgraphics.com, which gives the terms, additional limitations of the warranty, if any, and limitations of liability.

F. 3M™ MCS™ Warranty

Subject to Stipulations set forth in Section G., below

Finished graphics constructed with the materials specified and the exposure specified in the Warranty Period Tables, Section F.(1), is eligible for the $3M^{TM}$ MCSTM Warranty. For warranties for other exposures, see Section G.(1).

(1) Warranty Period Tables

for Finished Graphics in a Standard U.S. Vertical Exposure Note: Graphics applied to corrugated surfaces have a reduced Warranty Period.

See Section 4. for Graphic Type definitions:

COR = Corrugated Surfaces on all Graphic Types listed below

IN = Indoor Signs

OEM = OEM Graphics

OUT = Outdoor Signs

RAIL = Rail car Graphics

SIGN = Indoor and Outdoor Signs

VEH = Vehicle, RV, Straight Truck, Semi-Tractor and Semi-Trailer Graphics

Warranty Period for Finished Graphics, in Years

a. Screen Printing

Ink Series	No Printing					SOLVEN	T Ink Ser	ies 1900)	
Graphic Protection	VEH	RAIL	SIGN	OEM	COR	VEH	RAIL	SIGN	OEM	COR
1920DR, air dry	_	_	_	_	_	5	5	5	5	3
1920DR, oven dry	_	_	_	_	_	6	6	5	5	3
1930	_	_	_	_	_	2	2	2	2	2
9730UV	_	_	_	_	_	3	3	3	3	_
9740i	_	_	_	_	_	6	6	5	5	_
9800CL	_	_	_	_	_	_	_	_	_	_
None	7	8	6	5	3	_	_	_	_	_

Ink Series	UV Ink Series 9800				ι	JV Ink Se	ries 980	0 Metalli	ic	
Graphic Protection	VEH	RAIL	SIGN	OEM	COR	VEH	RAIL	SIGN	OEM	COR
1920DR, air dry	_	_	_	_	_	_	_	_	_	_
1920DR, oven dry	_	_	_	_	_	_	_	_	_	_
1930	_	_	_	_	_	_	_	_	_	_
9730UV	3	3	3	3	3	_	_	_	_	_
9740i	7	7	5	5	3	5	_	5	5	3
9800CL	5	5	5	5	3	5	_	5	5	3
None	_	_	2	_	_		_		_	_

b. Electrostatic Printing

Toner Series		87	00	
Graphic Protection	VEH	OUT	IN	COR
8519	7	4	8	3
8520	7	4	8	3
8912	5	4	8	_
8915	_	_	8	_
1920DR	5	4	8	_

G. General Warranty Stipulations for 3M[™] MCS[™] Warranty and

(1) Reduced Warranty Period for Other Graphic Exposures These stipulations apply to graphics covered by the 3MTM MCSTM Warranty. General provisions for these stipulations are covered in the 3M Commercial Graphics Warranty Brochure at 3Mgraphics.com.

For other graphic exposures, multiply the Warranty Period (in years) for your graphic construction as shown in the applicable Warranty Period Tables, Section F.(1), by the percentage shown for the intended graphic exposure. See page 3 for the graphic exposure definitions.

If the Graphic Exposure is:	Use this Percentage of U.S. Vertical Exposure, Warranty Period	Calculation Examples
U.S. Non-vertical	50% (0.5)	0.5 x 7 years = 3.5 years 0.5 x 4 years = 2.0 years
Desert Southwest Vertical	70% (0.7)	0.7 x 7 years = 4.9 years 0.7 x 4 years = 2.8 years
Desert Southwest Non-vertical	35% (0.35)	0.35 x 7 years = 2.45 years 0.35 x 4 years = 1.4 years
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. However, to help maintain the appearance of your graphic, use the recommended graphic protection whenever:
 - it is required for the construction and end use as shown in the Warranty Period Tables.
 - the graphic, including printed vehicle graphics, is exposed to abrasive conditions, harsh cleaners or chemicals.
 - it is necessary to prevent chalking on unprinted films. Use standard screen printing methods to apply clear coats.
- Clear 1930 may haze, which is not warranted.

(3) Application to Glass

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

(4) Application Outside the U.S.

Contact the 3M organization for that country.

(5) Graphics Made with Components Not Sold or Recommended by 3M The **3MTM MCSTM Warranty** does not, under any circumstances, cover graphics made with inks, film, graphic protection and/or application tapes that are not sold or recommended by 3M.

6. 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 (screen printing).
- · 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.

7. Graphics Manufacturing



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

A. Screen Printing

Formulations and processing conditions can affect ink durability. Carefully follow limitations of specific inks and the instructions in the appropriate Product and Instruction Bulletins. Refer to the 3M Related Literature section.

B. Electrostatic Printing

Refer to the 3M Related Literature section for Instruction Bulletins that discuss digital printing methods.

An electrostatically printed image can be transferred with heat and pressure to this film.

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

(1) Methods

C. Cutting

Bandsawing Guillotine Hot kiss cutting Hand cut

Drum-type electronic cutting Cold and hot steel-rule die cutting

Knifeless™ Tape Flat-bed electronic cutting

(2) Size of Cut Text

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

Minimum stroke width: 0.25 inch (6.35 mm) Minimum height: 3.0 inch (76.2 mm) Minimum radius for end of stripe: 0.125 inch (3.18 mm)

D. Graphic Protection

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

- Overlaminates must be cold or hot roll applied.
- E. Application Tapes
 - (1) When to Use Premasking Tape
 - (2) When to Use
 - Prespacing Tape
- Use when little or no liner is exposed.

Use as application aid to increase stiffness, and prevent stretching and damage during

application.

- 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.

Determine whether you want to premask the graphic or prespace cut pieces of film such as letters. In the table below, locate the last coating applied to your graphic and use the corresponding tape. See <u>Instruction Bulletin 4.3</u> for complete details.

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

Select the tape based on what is on top of the graphic

Таре	No clear 9730UV 9740i 9800CL, Ink series 9800	Unprinted film 1920DR 1930	8519 8520 8912 8915
Premasking Tape SCPM-44X		_	_
Prespacing Tape SCPS-53-X		_	_
Premasking Tape SCPM-3	_		
Prespacing Tape SCPS-2	_		

^{— =} The use of this application tape is not recommended in this construction.

(3) How to Select a Tape

8. Application and Installation

Install the film using the dry application method.

Note: Do not use a detergent and water or a commercial application liquid to position the graphic on a vehicle.

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.

A. Substrate Preparation

Stainless steel must be cleaned according to the recommendations in <u>Instruction Bulletin 5.1.</u>

B. Pressure-activated Adhesive

- The pressure-activated adhesive on this film offers:
 - smooth sliding into position on a substrate;
 - fast finger tacking to check position; and
 - easy snap up and repositioning when you need it.

• The snap up and reposition feature is lost:

- when firm pressure with a squeegee or other application tool is applied.
- at application temperatures above 100°F (38°C) even if only light finger pressure was used for tacking.
- if any part of the film is removed from the original liner and reapplied to the same or another liner.

C. Edge Sealing

- Do NOT apply edge sealer to stainless steel substrates.
- Cut completely around all rivets on stainless steel substrates.
- If an edge sealer is used for other substrates, use edge sealer 3950. Refer to <u>Instruction</u>
 <u>Bulletin 5.4</u> to determine when edge sealing can provide added protection to minimize edge lifting from external sources such as power washing.

9. 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).

Chalking on unprinted film can be washed off with normal graphic cleaning methods.

10. Removal

This is not a removable film. Removal requires a solvent-based or mechanical remover system. See <u>Instruction Bulletin 6.5</u> for details.

11. Shelf Life, Storage and Shipping

A. Shelf Life

Total shelf life: 3 years from the date of manufacture on the original box. If you <u>do process</u> the film, do so within 2 years and apply within 1 year. If you <u>do not process</u> 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 (may be separated by paper), or rolled printed side out on 5 inch (13 cm) or larger core. This helps prevent the liner and, if used, the application tape from popping off.

12. Health and Safety



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 <u>3M.com/MSDS</u>, 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.

13. 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. <u>Current Bulletins</u> are available at 3Mgraphics.com. The techniques described in these Bulletins are required when applying a 3M warranted graphic, but are also practical recommendations when using promotional materials for non-warranted graphics. 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	Туре	Bulletin No.
3M [™] Screen Printing Ink Series 1900 and Overprint Clear VI0402 - Screen printing with ink series 1900 - line color - Screen printing with ink series 1900 - 4-color	PB IB IB	1900 3.12 3.11
3M™ Screen Printing UV Ink Series 9800 - Screen printing with UV ink series 9800 - line color - Screen printing with UV ink series 9800 4-color	PB IB IB	9800 3.20 3.21
3M™ Screen Print UV Clears 9730UV, 9740i	PB-IB	UV Clears
3M Graphic Protection Products - Hot and cold roll lamination	PB IB	GP-1 4.22
Scotchprint® Toner Series 8700/8800 - Using toner series 8700/8800	PB IB	8700 4.12
3M [™] Trident Transfer Paper - Transferring and laminating electrostatically printed images	PB IB	Trident 4.7
3M™ Edge Sealer 3950	PB	3950
Using 3M application tapes; premasking and prespacing for films	IB	4.3
Scoring and cutting	IB	4.1
Application, substrate selection, preparation and substrate-specific application techniques	IB	5.1
Application, general procedures for indoor and outdoor dry applications	IB	5.5
Application, special applications and vehicles	IB	5.4
Storage, handling, maintenance, removal	IB	6.5
3M Commercial Graphics Warranty Brochure	www.3M	lgraphics.com

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14. Bulletin Change Summary

Modified and new content is marked with a black bar in the margin. Clear 8920 ES has been discontinued; please use clear 1920DR with the same performance and warranty. Clear 9740i directly replaced clear 9720UV. Reformatted the Product Description section and the Warranty Information section for better understanding of important terms used in Commercial Graphics Technical Literature and the Graphic Types definitions have been updated to align with the 3M Commercial Graphics Warranty Brochure. Warranted Durability is now referred to as Warranty Period. Updated Warranty Periods for both screen and electrostatic printing. Included Knifeless tape as a recommended cutting method.



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