



# 3M™ Controltac™ Graphic Film Series VHR180 and 3M™ Controltac™ Graphic Film Series VHR IJ180

## Product Description

Part of the 3M Rail Graphic Total range, 3M™ Controltac™ Graphic Marking Film Series VHR180 is a range of durable, dimensionally stable high performance films ideal for complex livery designs over flat, curved and corrugated surfaces with or without rivets.

### Key Features

- Positionable and repositionable pressure activated adhesive, making it an excellent choice for large graphics
- Custom Colour Matching
- Designed for screen or digital printing
- Wide application temperature range
- Pigmented adhesive for excellent hiding power
- High performance permanent adhesive, graphics can be removed with little or no adhesive residue
- Conformance to BS6853:1999 fire regulations
- Conformance to GM/RT 2120 Issue 2 (April 2004)

## Applications and Uses

Film series VHR180 is intended for making high performance durable graphics for rail rolling stock. When used with the listed **Compatible Products** these graphics are covered by the Scotchprint® Graphic Premium Rail Warranty.

## Limitations of End Uses

Specifically, we do not warrant this film for the following:

- Graphics regularly subjected to petroleum vapours or spills
- Graphics applied to stainless steel substrates
- Non rail rolling stock applications

## Product Line

Product No.	Colour	Stock Availability
VHR180-10	White	Stock item
VHR180-12	Black	Stock item
VHR IJ180-10	White	Stock item
VHR180-120	Aluminium	Non-stock item
VHR180-131	Gold *	Non-stock item
VHR180-13	Tomato Red	Non-stock item
VHR180-14	Bright Orange	Non-stock item
VHR180-15	Bright Yellow *	Non-stock item
VHR180-17	Vivid Blue	Non-stock item
VHR180-25	Sunflower *	Non-stock item
VHR180-27	Indigo	Non-stock item
VHR180-37	Sapphire Blue	Non-stock item
VHR180-47	Intense Blue	Non-stock item

*\*Indicates clear adhesive (and, therefore, less hiding power); all other adhesive is grey-pigmented*

Please contact the 3M sales office for lead times on non-stock items. Custom colour matching is also available on this product. Refer to the 3M Commercial Graphics Price List for stock availability and lead times.

## Compatible Products

- 3M™ Screen Printing Ink Series 1900 (line colour and 4-colour)
- 3M™ Screen Printing Ink Series 9700UV (line colour and 4-colour)
- 3M™ Piezo Ink Jet Ink Series 1500
- 3M™ Piezo Ink Jet Ink Series 4600
- 3M™ Scotchcal™ Graffiti Resistant Film 639
- 3M™ Screen Print Clear Coats
- Selected 3M application tapes

## Main Characteristics

Property	Description
Film Type	0.05 mm opaque vinyl
Adhesive type	Positionable, permanent, pressure activated
Adhesive colour	Grey Pigmented (some standard colours have clear adhesive – see 180 colour chart)
Thickness (film plus adhesive) Thickness (ISO 4593)	0.08 to 0.10 mm
Liner	Premium Performance Liner 150g/m <sup>2</sup>
Suitable application surface	Flat and corrugated surfaces with and without rivets, simple curves, moderate compound curves
Suitable application substrates	ABS resins, aluminum, chrome, glass fiberglass-reinforced plastic, paint (check adhesion to powder or water-base paints)
Application temperature range (substrate, air and graphic)	Flat surfaces with and without rivets: 4° to 38°C* Corrugated surfaces with rivets: 10° to 38°C*

\* For applications nearing the minimum temperature range, please contact your local technical service representative to confirm suitability of application.

## Chemical and Physical Properties

Values given are typical and are not for use in specifications. If a custom specification is desired, a request should be submitted through your sales representative. The data given below is for unprinted film

### Physical Properties

Property	Metric Units
Tensile Strength (ISO 1184-1983)	22 N/25mm min at 23°C
Elongation (ISO 1184-1983)	50% at 23°C
Dimensional Stability (FTM 14)	0.4mm
Temperature Range	-60°C to +107°C
Reverse impact Resistance at 23°C at 4°C	No effect No effect

### Adhesion (FTM1)

Substrate	Metric Units (N/25mm)
Etched Aluminium	23.0
Anodised Aluminium	27.0
Chrome	22.0
Acrylic Enamel	16.0
ABS	19.0

These adhesion values are 24 hours after application.

**Note:** ISO refers to standards of the International Standards Organisation. FTM (Fimat Test Methods) refers to test methods listed by Fimat, the Association of European Tape Manufacturers.

## Flammability

3M™ Controltac™ Graphic Film Series VHR180 and  
3M™ Controltac™ Graphic Film Series VHR IJ180  
Conform to:-

- BS6853:1999 fire regulations, category 1a, 1b and II
- GM/RT 2120 Issue 2 (April 2004)

## Warranty

Only a Scotchprint® Graphics Authorised Manufacturer can produce Scotchprint® Premium Rail Warranted Graphics. The warranty period is based on field experience and exposure tests. When the graphics are processed and used according to the 3M recommendations, they should have the performance life shown in the table below. The actual performance depends on the:

- Correct combination of film and ink
- Ink formulation
- Drying methods
- Selection and preparation of the substrate
- Application methods
- Exposure conditions
- Cleaning methods

## Warranted Durability for Rail Rolling Stock in the UK

The following tables show the warranties, in years, for exposure where the face of the graphic is vertical at  $90^\circ \pm 10^\circ$ .

### Graphic Orientation



### Vertical Exposure

Face of graphic is  $\pm 10^\circ$  from vertical

Colour	Ink Series <sup>(1)</sup>	Protective Clears/Laminates <sup>(2)</sup>	Exterior	Interior
VHR180 White/Black/Colours	Unprinted		6	6
	Unprinted	Scotchcal 639	6	6
VHR 180-10 White	<b>Screen Printing</b>			
	1900/9700 Line/Halftone	Scotchcal 639	6	6
	1900/9700 Line/Halftone	1920, 9720, 1955abc	6	6
VHR IJ180-10 White	<b>Digital Printing</b>			
	1500/4600	Scotchcal 639	6	6
	1500/4600	1920, 9720, 1955abc	6	6

<sup>(1)</sup> Metallic inks have a maximum warranty of 5 years.

<sup>(2)</sup> A clear coat protective layer will provide less abrasion resistance than a laminate. Therefore some degradation of a printed image may occur if the graphics are subjected to abrasive washing conditions.

Refer to 3M™ MCS™ Warranty Document for details.

## 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 minimum values for electro-cutting text from film series VHR180 are based on upper case Helvetica medium type. Weeding can be more difficult with smaller text.

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

## Application Tapes

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

- Use a prespacing tape if the graphic has large amounts of the liner exposed.
- Use a premasking tape if very little of the liner is exposed.

Overprint Clear	Prespacing Tape	Premasking Tape
Unprinted	SCPS-100	SCPM-19
1920DR	SCPS-100	
1955abc	SCPS-2	SCPS-100
9720UV	SCPM-44X	SCPM-44X

## Application

Refer to the Instruction Bulletin 5.4 and 5.5 for application details.

The following application details are for film series VHR180.

### Temperature

The application temperature range:

- Flat surfaces with and without rivets is 4° to 38°C\*
- Corrugated surfaces with rivets is 10° to 38°C\*

\* For applications nearing the minimum temperature range, please contact local technical service representative to confirm suitability of application.

### Positioning

This film has a positionable adhesive. Application pressure bonds the adhesive to the substrate and destroys the positionability feature. The film loses its positionability feature at application temperatures above 38°C.

Do not use detergent and water or a commercial application liquid to position the graphic onto rail rolling stock.

## 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).

## Removal

By following the procedures recommended in Instruction Bulletin 6.5, Controltac Graphic Marking Film Series VHR180 graphics can be removed for up to 6 years.

### Removability Exceptions

1. Aged paint and metals must be tested to ensure removability. Surface oxidation or chalking may result in adhesive residue upon removal.
2. Paint and/or filler that is not firmly bonded to the substrate may be damaged when removing the film.
3. Paint that is not properly cured may prevent the film from being removed.

## Shelf Life

The shelf life of the film is 2 years and should be applied within 2 years of the receipt of film if unprocessed. Processed film should be applied within 1 year of processing and within 2 years of receipt of the film.

## Related 3M Literature

Listed below is related 3M Technical Literature which may be of interest:

Subject	Bulletin No.
<b>Product Bulletins</b>	
3M™ Piezo Ink Jet Ink Series 1500	1500
3M™ Piezo Ink Jet Ink Series 4600	4600
3M™ Screen Printing Ink Series 1900	1900
3M™ Screen Printing Ink Series 9700UV	9700
3M™ Overprint Clear & Edge Sealer 1955ABC	1955
3M™ Scotchcal™ High Gloss Overlamine 639	639

Subject	Bulletin No.
<b>Instruction Bulletins</b>	
Design of graphics	2.1
Printing with piezo ink jet ink series 2300	4.45
3M™ Piezo Ink Jet Ink Series 4600	4.43
Screen printing with ink series 1900	3.12
Screen printing with 3M™ Overprint Clear & Edge Sealer 1955ABC	3.12.2
Screen printing with ink series 9700 UV	3.4
Cold roll lamination	4.22
Scoring and cutting	4.1
Using 3M application tapes; premasking and prespacing for films	4.3
Application, substrate selection, preparation and substrate-specific application techniques for rail applications	5.1.1
Application, special applications and vehicles	5.4
Application, general procedures for interior and exterior dry applications	5.5
Storage, handling, maintenance, removal	6.5

## Glossary of Terms

### Matched Component System or MCS

The system pursuant to which Finished Graphics are produced by a Graphic Manufacturer using only 3M Products and components and manufactured in accordance with 3M's Product or Instruction Bulletins, 3M Specification Document and using 3M Approved Technologies.

### 3M™ Controltac™

A film with 3M™ Controltac™ positionable adhesive system has million of precision-placed microscopic glass spheres embedded within its adhesive layer. These spheres help to prevent the adhesive from fully contacting the application surface until pressure is applied. This enables the graphic to be positioned, then re-positioned as many times as necessary, until it is in exactly the right place before final application.

### Permanent Adhesive

Films with a permanent adhesive can be removed but will often require heat and/or chemicals for effective removal.

## Health & Safety

Refer to the package label and the Material Safety Data Sheet for health, safety, and handling information on the products referenced in this bulletin. For 3M products, if necessary, you may contact our Toxicology/Product Responsibility Department on 01344 858000.

## Important Notice to Purchaser

The 3M products described in this publication are covered by a 3M warranty and limitation of liability.

3M's warranty provides that if 3M finds that goods are defective in material or workmanship they will be replaced or the price refunded at 3M's option but note that 3M does not accept liability for other direct losses (except for personal injury or death) or consequential losses relating to defective products or from information supplied by 3M.

Purchasers and users of 3M products, and not 3M supplying companies, are always solely responsible for deciding on the suitability of the 3M product for their required or intended use.

## Technical Assistance

For help on specific questions relating to 3M Commercial Graphics Division Products, contact your local Technical Service Representative.

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