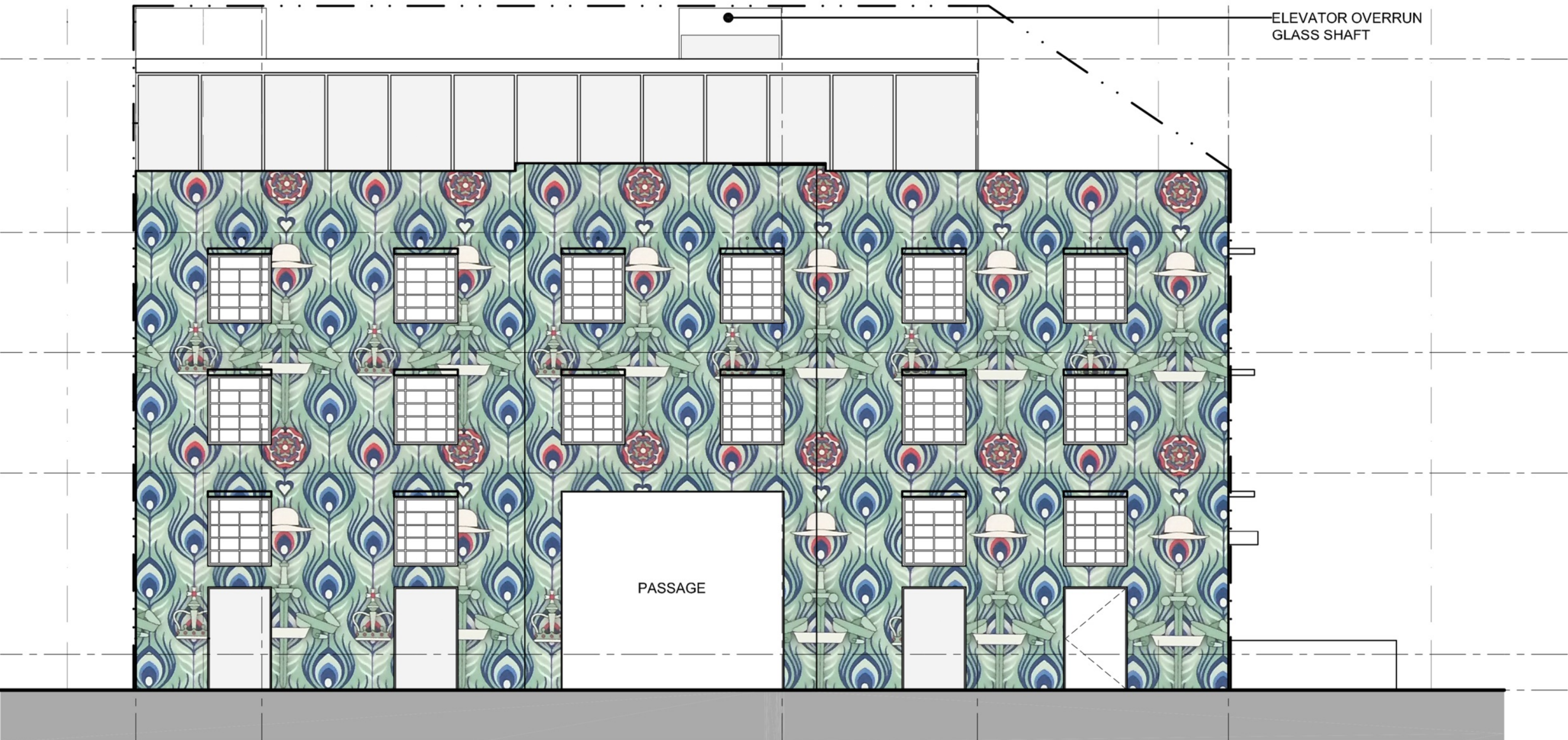


9'-3" [2.82m] 38'-1 3/4" [11.62m] 14'-3 3/4" [4.37m] 18'-5" [5.61m]

South Elevation



GRAPHIC PRINT



PRINT
WALLPAPER

- Peacock feathers
- Crown
- Hat
- Peacock



* FAENA BAZAAR PONT
Job 2016 1/1
* PATTERN & HEADLIGHT
* SKETCH DESIGN
* NO SCALE

DATE:

TYPE:

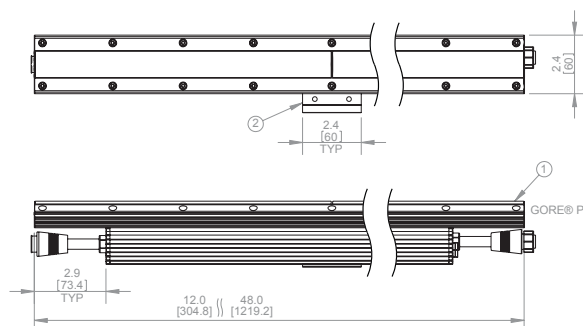
PROJECT:

FIRM :

EcoSpec®

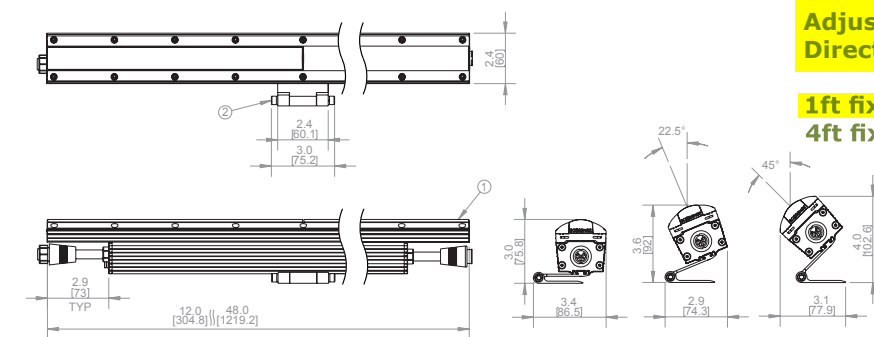
Linear HP EXT Wall Wash

Dimension and Mounting

For complete dimensional submittal drawings and full scale CAD drawings, please visit ecosenselighting.com.

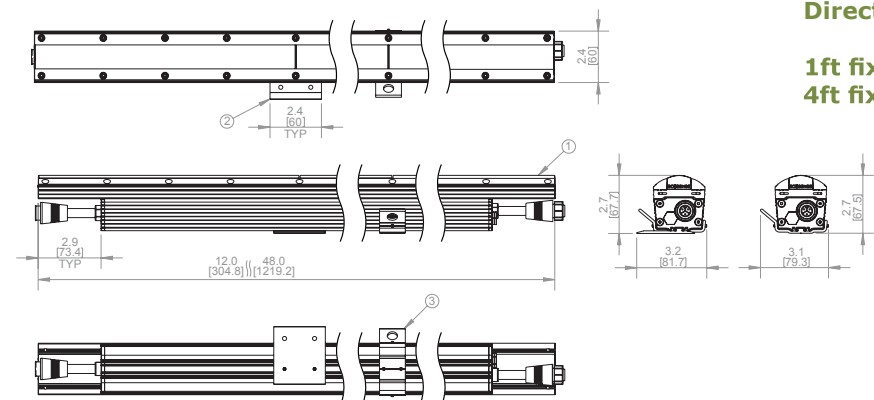
Flat Mounting Plate - Direct Mount: 10-A-MNT-FLAT

1ft fixture = 1 Bracket
4ft fixture = 2 Brackets



Adjustable Bracket - Direct Mount 11-A-MNT-ADJ


1ft fixture = 1 Bracket
4ft fixture = 2 Brackets



Safety Bracket - Direct Mount 11-A-MNT-SAFT

1ft fixture = 1 Bracket
4ft fixture = 2 Brackets

DIMENSION IN
INCHES / [MM]

Submitted by Envision Lighting Systems		Catalog Number: 11LC12-30-120-6/10 11-A MNT ADJ	Type: A-TX
	Job Name: ATLANTIC HOTEL	Notes:	ELS15-50699

DATE:	TYPE:
PROJECT:	
FIRM :	

EcoSpec[®]

Linear HP EXT Wall Wash

Ordering Information

Choose the option that best suits your needs and write its corresponding code on the appropriate line to form the product code.

11LC	-	-	-	-
MODEL	LENGTH	COLOR	VOLTAGE	OPTIC
11LC	12 - 1'-0" 48 - 4'-0"	27 - 2700K 30 - 3000K 35 - 3500K* 40 - 4000K	120 - 100-120VAC 220 - 220-240VAC 277 - 277VAC**	6 - 6° x 6° 10 - 10° x 60° 17 - 17° x 35° 30 - 30° x 60° 60 - 60° x 60°

Order accessories as separate catalogue numbers from the **Accessories** section below.

EXAMPLE: 11LC-12-30-120-6

* 3500K not available in CE (220-240VAC), consult EcoSense Sales Representative for information.

Accessories

Wiring

Leader Cable 10'-0" (UL)*	EXT-A-CBL-120-10	Leader Cable 10'-0" (CE)*	EXT-A-CBL-220-10
Jumper Cable 1'-0" (UL)	EXT-A-JMP-120-1	Jumper Cable 1'-0" (CE)	EXT-A-JMP-220-1
Jumper Cable 5'-0" (UL)	EXT-A-JMP-120-5	Jumper Cable 5'-0" (CE)	EXT-A-JMP-220-5

* One (1) terminator is included standard with each Leader Cable

** The 120VAC (UL) Accessory Cables are also rated for 277VAC use

Mounting

Flat Mounting Plate	10-A-MNT-FLAT (Included with each product length.)
Adjustable Hinge Bracket	11-A-MNT-ADJ
Safety Bracket	11-A-MNT-SAFT

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Specifications subject to change without notice.
Visit www.ecosenselighting.com for the most current specifications.
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www.ecosenselighting.com

(V 11.30-2012)

ECOSENSE[®]

DATE:

TYPE:

PROJECT:

FIRM :

Features

Dimmable
Flicker-Free
In-line Connection
Long Life
Instant On
RoHS Compliant
Lead Free
Mercury Free
No UV

ECOSENSE®

EcoSense Lighting Inc.
80 Broad Street
5th Floor
New York, NY 10004

www.ecosenselighting.com

Phone 212-228-8118
Fax 212-228-9113
Toll Free 855.632.6736
855.6.ECOSEN

(V. 3.15-2013)

EcoSpec® Linear HP EXT Wall Wash





EcoSense® EcoSpec® Linear HP EXT Wall Wash is an ultra-bright exterior linear white light fixture. Brighter than fluorescent tubes, these flicker-free dimmable fixtures offer an earth-friendly, mercury free cove solution.

Leveraging years of lighting experience, this robust aluminum frame fixture features powerful, energy efficient LEDs and precision constant current circuits for long-life applications.

With smart power technology, EcoSpec® Linear HP EXT Wall Wash connects directly to AC power; simplifying installation and minimizing costs. These long-life fixtures quickly pay for themselves in energy savings and maintenance costs, providing substantial savings over the 50,000 hour lumen maintenance.




Specifications

Color Temperature	Lumen Output (6° x 6°)
2700K	755 lm/LF : 3020 (4')
3000K	886 lm/LF : 3544 (4')
4000K	985 lm/LF : 3940 (4')
Color Rendering Index	80
Lumen Maintenance*	L ₇₀ 120,000 hours @ 25C
Beam Angle	6° x 6° / 10° x 60° / 17° x 35° / 30° x 60° / 60° x 60°
Power Consumption (Max)	120VAC – 17W (1ft) / 68W (4ft) 220VAC – 17W (1ft) / 68W (4ft) 277VAC – 17W (1ft) / 68W (4ft)
Efficacy (lm/W)	120VAC – 44.4 @ 2700K / 52.1 @ 3000K / 57.9 @ 4000K 220VAC – 44.4 @ 2700K / 52.1 @ 3000K / 57.9 @ 4000K 277VAC – 44.4 @ 2700K / 52.1 @ 3000K / 57.9 @ 4000K
Maximum Fixture Run Length	50' (15m) @120VAC / 90' (25m) @220VAC / 120' (40m) @277VAC
Operating Temperature	-4°F to 122°F (-20°C to 50°C)
Operating Voltage	100-120VAC, 220-240VAC, 277VAC, 50-60Hz
Dimming	120VAC / 220VAC – ELV Type, Reverse Phase, Trailing Edge Dimming 277VAC – Non-Dim Only
Housing	Aluminum; Clear Polycarbonate Lens
Fixture Connectors	Integral male / female 3-pin connectors
Fixture Rating	CE Certified - IP66 UL Certified for Wet Locations
Warranty	5 Years
Weight	2.43lbs /1.1kg (1ft); 10.4lbs /4.7kg (4ft)
Dimensions	W 3.1" x H 2.7" x L 12"/48" (79.5 mm x 67,7 mm x 305mm/1,219 mm)
Certifications	    

Restriction of Hazardous Substances Directive (RoHS) implements EU Directive 2002/95 which bans placing electrical and hazardous equipment that contains more than agreed levels of hazardous substances on the EU market. For a list of these substances visit www.rohs.gov.uk.

*Calculations for LED fixtures are based on measurements that comply with IES LM-80 testing procedures and IES TM-21 Calculator.

www.ecosenselighting.com

Submitted by Envision Lighting Systems		Catalog Number: 11LC-12-30-120- 6/10 11-A- MNT ADJ Notes:	Type: A-TQ ELS15-50699
	Job Name: ATLANTIC HOTEL		

EcoSpec[®]

Linear HP EXT Wall Wash

Ordering Information Choose the option that best suits your needs and write its corresponding code on the appropriate line to form the product code.

11LC	-	-	-	-
MODEL	LENGTH	COLOR	VOLTAGE	OPTIC
11LC	12 - 1'-0"	27 - 2700K	120 - 100-120VAC	6 - 6° x 6°
	48 - 4'-0"	30 - 3000K	220 - 220-240VAC	10 - 10° x 60°
		35 - 3500K*	277 - 277VAC**	17 - 17° x 35°
		40 - 4000K		30 - 30° x 60°
				60 - 60° x 60°

Order accessories as separate catalogue numbers from the **Accessories** section below.

EXAMPLE: 11LC-12-30-120-6

* 3500K not available in CE (220-240VAC), consult EcoSense Sales Representative for information.

Accessories

Wiring

Leader Cable 10'-0" (UL)*	EXT-A-CBL-120-10	Leader Cable 10'-0" (CE)*	EXT-A-CBL-220-10
Jumper Cable 1'-0" (UL)	EXT-A-JMP-120-1	Jumper Cable 1'-0" (CE)	EXT-A-JMP-220-1
Jumper Cable 5'-0" (UL)	EXT-A-JMP-120-5	Jumper Cable 5'-0" (CE)	EXT-A-JMP-220-5

* One (1) terminator is included standard with each Leader Cable

** The 120VAC (UL) Accessory Cables are also rated for 277VAC use

Mounting

Flat Mounting Plate	10-A-MNT-FLAT (Included with each product length.)
Adjustable Hinge Bracket	11-A-MNT-ADJ
Safety Bracket	11-A-MNT-SAFT

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Specifications subject to change without notice.
Visit www.ecosenselighting.com for the most current specifications.
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www.ecosenselighting.com

(V 11.30-2012)

ECOSENSE[®]

DATE:

TYPE:

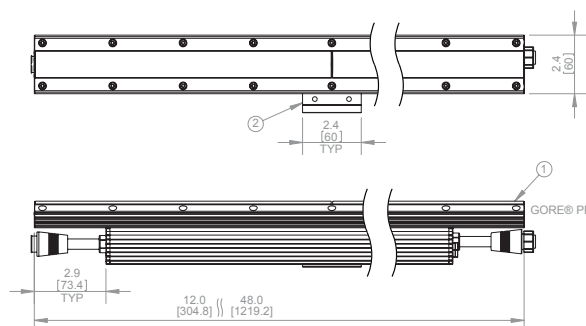
PROJECT:

FIRM :

EcoSpec®

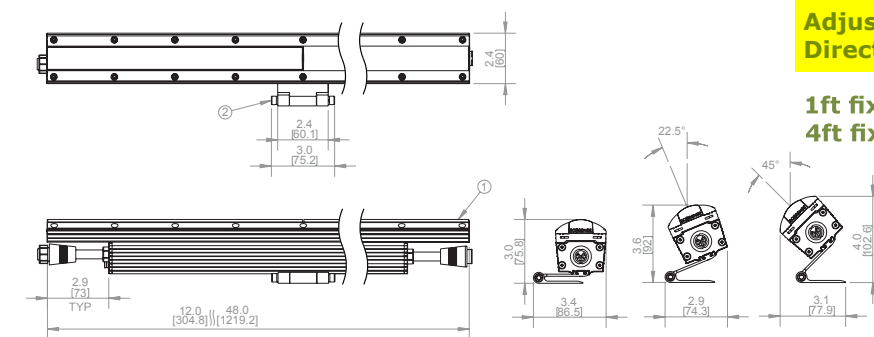
Linear HP EXT Wall Wash

Dimension and Mounting

For complete dimensional submittal drawings and full scale CAD drawings, please visit ecosenselighting.com.

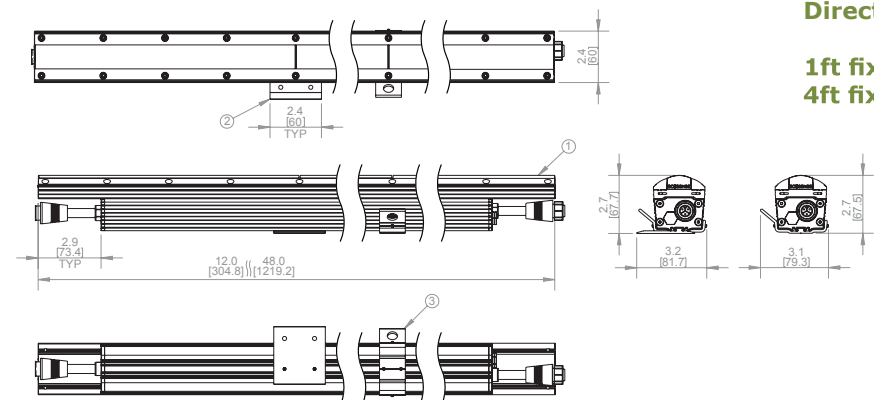
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Safety Bracket - Direct Mount 11-A-MNT-SAFT

1ft fixture = 1 Bracket
4ft fixture = 2 Brackets

DIMENSION IN
INCHES / [MM]


PROFESSIONAL
OUTDOOR LIGHTING

SPECIFICATION SHEET

Type:

Model:

Project:

MODEL 5260-LED Landscape Series • In-Ground & Well Lights

FIXTURE SPECIFICATIONS:

HOUSING:

Die-cast, copper-free aluminum with a silicone O-ring gasket – providing a superior weather-tight seal.

FINISH:

Polyester powder-coat finish available in Black, Verde, Architectural Brick, Architectural Bronze, Light Bronze, Dark Bronze, Granite, Pewter, Terracotta, Rust, Hunter Green, Mocha, Weathered Bronze, Weathered Iron, and White.

LENS:

Clear, convex, tempered, shock & heat-resistant, soda-lime glass lens. Optical effect lenses are available; see accessories column on fixture ordering information chart.

EMITTER TYPE:

High Output LED with Vista exclusive smart-driver, powered to operate for 50,000 hours.

OPTICS:

Integral high-efficiency optics available in spot through flood beam spreads.

ELECTRICAL:

Input voltage range 10.5–15V AC, regulated to achieve uniform illumination throughout the cable run of fixtures. Integral surge & reverse polarity protection.

MOUNTING:

In-grade. Mounting accessories not required.

FASTENERS:

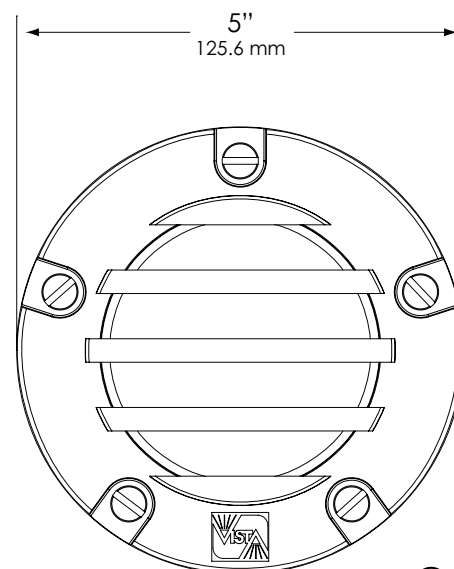
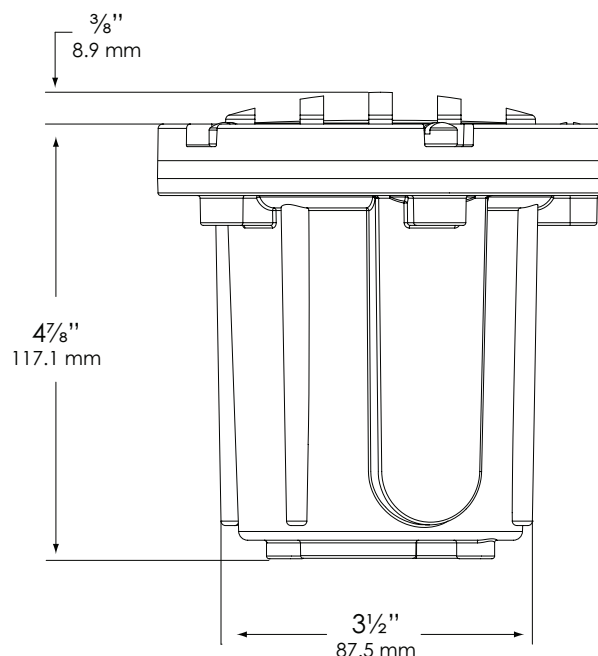
All fasteners are stainless steel.

WIRING:


Prewired with a three-foot pigtail of 18-2 direct-burial cable and underground connectors for a secure connection to supply cable.

All Vista luminaires are **MADE IN U.S.A.**

DIMENSIONS:



Vista Professional Outdoor Lighting reserves the right to modify the design and/or construction of the fixture shown without further notification.

Submitted by Envision Lighting Systems		Catalog Number: GW-5260-G-W-LF9MF	Type: A-TJ
	Job Name: ATLANTIC HOTEL	Notes:	ELS15-50699



PROFESSIONAL
OUTDOOR LIGHTING

SPECIFICATION SHEET

MODEL 5260-LED Landscape Series • In-Ground & Well Lights

FIXTURE ORDERING INFORMATION

TO ORDER FIXTURE: Select appropriate choice from each column as in the following example.

EXAMPLE: GW-5260-B-W-LF3SP-SL

MOUNTING	MODEL	FINISH	COLOR TEMP	LAMP	ACCESSORIES
GW - In-grade	5260	B- Black G- Verde BR- Architectural Brick Z- Architectural Bronze LZ - Light Bronze DZ - Dark Bronze GT- Granite P- Pewter TC- Terra-cotta R- Rust HG- Hunter Green M- Mocha WB- Weathered Bronze WI- Weathered Iron W- White	W - Warm C - Cool	LF3SP - 3 emitter, 5W, Spot LF3MF - 3 emitter, 5W, Medium Flood LF3WF - 3 emitter, 5W, Wide Flood LF6SP - 6 emitter, 10W, Spot LF6MF - 6 emitter, 10W, Medium Flood LF6WF - 6 emitter, 10W, Wide Flood LF9SP - 9 emitter, 17W, Spot LF9MF - 9 emitter, 17W, Medium Flood LF9WF - 9 emitter, 17W, Wide Flood LED - Group F Emitter Qty - 3, 6, or 9 Temperature - Warm (W) or Cool (C) Operating voltage range - 10.5 to 15V. (Please see lamp order code column on lamp guide, Vista product catalog.)	BL- Flat Cool Blue lens SL- Flat Spread lens FR- Flat Frosted lens DBL- Flat Dark Blue lens GL- Flat Dark Green lens RL- Flat Red lens YL- Flat Amber lens HL- Honeycomb louver

Fixtures shipped with standard lamp, unless otherwise specified.

Vista Professional Outdoor Lighting reserves the right to modify the design and/or construction of the fixture shown without further notification.

**LX480Cv3
SV480Cv3****Quick Links**

[3M Graphics Warranties](#)
[Technical Information Selector](#)
[Safety Data Sheets \(SDS\)](#)
[Flammability \(ASTM E84 Reports\)](#)
[Videos](#)

Product Description

- Use LX480Cv3 with Latex Inkjet Inks
- Use SV480Cv3 with Solvent Inkjet Inks
- Use LX480Cv3 or SV480Cv3 with UV Inkjet or Screen Print Inks
- High performance, 2-mil, white, non-PVC vinyl film with a luster finish

Product Features

- Pressure-activated adhesive for easy sliding, tacking, snap-up and repositioning
- Non-visible air release channels for fast and easy, bubble-free installations
- Many finished graphic constructions can be stretched up to 150% (i.e., a 10 inch [25 cm] piece of film can stretch to 15 inches [38cm]) without primer or relief cuts and maintain lift resistance; see "Stretchability" on page 8
- Flexible, highly conformable over compound curves, corrugations, deep channels, and rivets, and requires less heat during application than vinyl films
- Dimensional stability, for installation in hot or cold temperatures
- Removable with heat and/or chemicals; resists tearing in cooler temperatures for fast removal
- Expected Performance Life of 11 years (unwarranted period for unprinted film with no graphic protection, applied to a flat, vertical, outdoor surface)
- Expected Performance Life for Textured Surface Graphics of 2 years (indoor in most applications); and 6-12 months (outdoor when not used in freezing and thawing cycles). See "Factors that Affect Graphic Performance Life for Textured Surface Graphics" on page 5

**Environmental Benefits**

- Non-PVC, phthalate-free film
- Contains no added chlorine or halogens
- LX480Cv3, 8548G, and 8549L made in part from bio-based materials
- Manufactured using 58% less solvent

This product offers several environmental benefits. For more information about these benefits, visit 3Mgraphics.com/sustainability. Also visit 3Mgraphics.com/EnvisionWrap to see actual demonstrations using film LX480Cv3 and SV480Cv3.

Recommended Types of Graphics and End Uses

- Indoor and outdoor graphics and signs, including point-of-purchase and displays
- Fleet, vehicle, watercraft and transit graphics and wraps
 - Commercial vehicles and fleet trucks and trailers; emblems or striping
 - Personal vehicle graphics and wraps
 - Watercraft graphics (above the static water line only)
 - Bus graphics
 - Rail cars and lead cars of trains, light rail and subways
 - Non-vertical and horizontal vehicle wraps, watercraft and transit when protected with overlamine 8528, 8548G, or 8549L
- Small format original equipment manufacturer's (OEM) decorative and identification graphics, cautionary and safety labeling
- Smooth and textured walls graphics
 - Graphics applied to indoor smooth wall surfaces

- Graphics applied to indoor or outdoor moderately textured surfaces when protected with overlaminate 8548G or 8549L

When constructed and used as described in this Bulletin, these types of graphics and end uses may be warranted by the 3M™ MCS™ Warranty or the 3M Performance Guarantee. Please read the entire Bulletin for details.

Recommended Compatible Products

See [3Mgraphics.com/warranties](https://www.3mgraphics.com/warranties) for a complete list of compatible 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 may be eligible for the 3M™ MCS™ Warranty or 3M Performance Guarantee.

Screen Printing Inks for 3M™ MCS™ Warranty

- [3M™ Screen Printing Ink Series 1900 \(Solvent\)](#), line color and four color
- [3M™ Screen Printing UV Ink Series 9800](#), line color and four color

OEM Inkjet Inks and Printers for the 3M Performance Guarantee

See the [3M Performance Guarantee Matrix](#) for a complete list of compatible OEM Inkjet Inks and Printers that are approved by 3M for use with the base film covered in the Bulletin and used for the creation of a graphic that may be eligible for the 3M Performance Guarantee.

Graphic Protection

- [3M™ Scotchcal™ Gloss Overlaminate 8518](#)
- [3M™ Scotchcal™ Luster Overlaminate 8519](#)
- [3M™ Scotchcal™ Matte Overlaminate 8520](#)
- [3M™ Scotchcal™ Gloss Overlaminate 8528](#) *with horizontal vehicle warranty*
- [3M™ Envision™ Gloss Wrap Overlaminate 8548G](#) *with horizontal vehicle warranty*
- [3M™ Envision™ Luster Wrap Overlaminate 8549L](#) *with horizontal vehicle warranty*
- [3M™ Scotchcal™ Ultra Matte Overlaminate 8915](#)
- [3M™ Screen Print Matte Clear 1930](#)
- [3M™ Screen Print UV Gloss Clear 9800CL](#)
- [3M™ Screen Print Gloss Clear 1920DR](#)
- [3M™ Screen Print UV Gloss Clear 9740i](#)
- [3M™ Screen Print Low Gloss Clear 9730UV](#)

Application Tapes

See [3M Instruction Bulletin AT-1](#) to determine what application tape is recommend for your film or finished graphic.

Other Products

- [3M™ Edge Sealer 3950](#)
- [3M™ Edge Sealer Tape 8914](#)
- [3M™ Vehicle Channel Applicator Tool VCAT-2](#)
- [3M™ Roller L \(large hard roller\)](#)
- [3M™ Roller S \(small hard roller\)](#)

Certificate of 3M™ MCS™ Warranty

Graphics manufacturers who produce graphics made with all 3M Graphics Products, including 3M Ink purchased through a qualified 3M Distributor or 3M Printing Partner, may register to be recognized with a Certificate of 3M™ MCS™ Warranty. Only graphics manufacturers having a current Certificate of 3M™ MCS™ Warranty are eligible to extend this warranty to their customers.

Characteristics

These are typical values for unprocessed product. Processing may change the values.

Physical Characteristics

Characteristic	Value
Material	High performance non-PVC polymer
Film Color	White, opaque
Thickness	Without adhesive: 2 mil (0.05 mm) With adhesive: 3–4 mil (0.08–0.10 mm)
Adhesive	Pressure-activated (slide, tack, snap-up, reposition) with air release channels
Adhesive Color	Gray
Liner	Polyethylene-coated paper
Adhesion, Typical 24 hours after application	ABS 2–4 pounds/inch (0.36–0.72 kg/cm) Acrylic enamel 2–4 pounds/inch (0.36–0.72 kg/cm) Aluminum, anodized 5–7 pounds/inch (0.89–1.26 kg/cm) Aluminum, etched 4–6 pounds/inch (0.72–1.08 kg/cm) Fruehauf pre-painted panels 2–4 pounds/inch (0.36–0.72 kg/cm) Automotive clear coats 3–5 pounds/inch (0.54–0.89 kg/cm)
Tensile Strength	11–13 pounds/inch at 73 °F (1.98–2.34 kg/cm at 23 °C)
Chemical Resistance	<ul style="list-style-type: none"> Resists mild alkalis, mild acids, and salt Excellent resistance to water (<i>does not include immersion</i>) Resists occasional fuel spills
Flammability	ASTM E84 reports: LX480Cv3 and SV480Cv3 , or go to the On-line Product Catalog at 3Mgraphics.com All other test reports: call 1-800-328-3908

Application Characteristics

Characteristic	Value
Finished Graphic Application Recommendation	Sign and vehicle applications: <ul style="list-style-type: none"> Surface type: flat, with and without rivets, simple curves, compound curves, deep channels and corrugations Substrate type: ABS resins, aluminum, chrome, glass, fiberglass reinforced plastics, paint (check adhesion to powder-coated or water-based paints), fiberglass with gel coat Application method: Dry Application temperature: air and substrate Flat without rivets: 40–105 °F (4–40 °C) Curves or corrugations with rivets: 50–105 °F (10–40 °C) Compound curves and/or watercraft: 60–95 °F (16–35 °C) Walls: 40–100 °F (4–38 °C)
Applied Shrinkage	Less than 0.015 inches (0.4 mm)
Temperature Range After Application	-65 to +225 °F (-60 to +107 °C) (not for extended periods of time at the extremes)

Characteristic	Value
Graphic Removal	<p>Most substrates: Removable with heat and/or chemicals within the Warranty Period at 50 °F (10 °C) minimum (air and substrate)</p> <p>Wall applications: Varies with type of substrate; using heat enhances removal of film; may leave adhesive residue, may remove some surface paint or finish, may damage mortar.</p>

Warranty Information

Warranty Coverage Overview

The warranty coverage for each graphic is based on the user both reading and following all applicable and current 3M Product and Instruction Bulletins. The warranty period for eligible graphics is as stated in the 3M Graphics Warranties Matrices found at 3MGraphics.com/warranties, at the time that the film was purchased. The warranty period may be reduced and stipulations may apply for certain constructions and applications, as covered in the 3M Graphics Warranties Bulletin found at 3MGraphics.com/warranties.

The warranties set forth in the Warranty Bulletin are made in lieu of all other express or implied warranties, including any implied warranty of merchantability, fitness for a particular purpose, or arising out of a course of dealing, custom or usage of trade.

3M Basic Product Warranty

3M Graphics Products are warranted to be free of defects in materials and manufacture at the time of shipment and to meet the specifications stated in its applicable 3M Graphics Product Bulletin and as further set forth in the [3M Graphics Warranties Bulletin](http://3MGraphics.com/warranties).

Limited Remedy

The limited remedy applicable to each warranty is addressed in the 3M Graphics Warranties Bulletin found at 3MGraphics.com/warranties.

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 IN THE 3M GRAPHICS WARRANTIES BULLETIN), 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 3M'S GRAPHICS 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.

Warranty Period Matrices - Inkjet

See the 3M Graphics Warranties Matrices at 3MGraphics.com/warranties, for warranty period information specific to your film.

Warranty Period Matrices - Screen Print

Table A. Screen Print Warranty Period (in years) for Finished Graphics in a Standard U.S. Vertical Exposure (see [3M Graphics Warranties Bulletin](#) for Graphic Type Definitions).

Graphic Protection	Screen Print Solvent Ink Series 1900				Screen Print UV Ink Series 9800				Screen Print UV Ink Series 9800 Metallic			
	VEH	RAIL*	IN/OUT	OEM	VEH	RAIL*	IN/OUT	OEM	VEH	RAIL*	IN/OUT	OEM
1920DR, air dry	5	5	5	5	—	—	—	—	—	—	—	—
1920DR, oven dry**	6	6	5	6	—	—	—	—	—	—	—	—
1930	2	2	2	2	—	—	—	—	—	—	—	—
9730UV	3	3	3	3	3	3	3	3	—	—	—	—
9740i	6	6	5	5	7	7	5	5	5	—	5	5
9800CL	—	—	—	—	5	5	5	5	5	—	5	5

*Warranty for vertical railroad applications when printed with line color inks only.

**Warranty requires oven drying the last color of ink series 1900 and screen print 1920DR for 2 hours at 150°F (65°C).

Additional Limitations

See the 3M Graphics Warranties Bulletin at 3MGraphics.com/warranties, for terms, additional limitations of your warranty, if any, and limitations of liability.

Factors that Affect Graphic Performance Life

The actual performance life of a graphic is affected by:

- the combinations of graphics materials used.
- 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.

Factors that Affect Graphic Performance Life for Textured Surface Graphics

- **Installation techniques.** Improper installation techniques result in edge curling, lifting and/or poor adhesion.
- **Adhesion for outdoor graphics.** When testing film adhesion, the film is unlikely to be durable in outdoor applications if it can be easily removed from a textured surface (using a force of <2 pound/lineal inch (0.36 kg/cm)).
- **Outdoor graphics exposed to water from rain or irrigation systems.** Water can be trapped behind graphics applied outdoors, leading to lifting as well as the creation of mold.
- **Surface temperature.** Textured substrates that reach temperatures in excess of 135°F (57°C) may exhibit lifting, especially in mortar joints.
- **Texture variation.** More than 1/8 inch (3 mm) variation in high and low spots of substrate texture and mortar joints, as well as square cut or undercut mortar joints, may exhibit lifting.
- **Freezing and thawing cycles.** For a textured masonry wall that has both an indoor facing side and an outdoor facing side and no effective moisture barrier, moisture vapor transmission occurs naturally when the indoor surface has a room environment that is warmer and moister than the outdoor surface. When a graphic is applied to the outdoor wall and there are cycles of outdoor freezing and thawing, moisture can be trapped between it and the wall and result in graphic lifting, as well as in spalling both within the wall and on the outdoor facing wall. Such damage can be unsightly and costly to repair.
- **Removal.** Unsound substrates, paint, texture-finished wallboard and textured wallpaper may be damaged upon graphic removal.

Graphics Manufacturing

CAUTION

Before using any equipment, always read the manufacturer's instructions for safe operation.

Inkjet Printing

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

Total Ink Coverage

The maximum recommended total ink coverage for this film is:

- **270%** when printed with all approved 3M solvent inkjet inks.
- **280%** when printed with all approved 3M UV inkjet inks.
- **280%** when printed with all approved 3M latex inkjet inks.
- **250%** when printed on the Mimaki JV5 Series printer with HS ink series ([3M Performance Guarantee](#)).

Do not exceed the recommended total ink coverage for the ink series used on this film. Having too high a total physical ink amount on the film results in media characteristic changes, incomplete drying, overlaminate lifting, and/or poor graphic performance. For additional details about total ink coverage, refer to the 3M Product and Instruction Bulletin for 3M inks or the [3M Performance Guarantee Matrix](#) for OEM inks.

Completely Dry Graphics

IMPORTANT NOTE

Incomplete drying can result in graphic failure including curling, increased shrinkage and adhesion failure, which are not covered under any 3M Graphic Warranty.

See the ink's 3M Product and Instruction Bulletin for more details.

Printing on Sheeted Film

3M does not recommend inkjet printing on sheeted film because material handling can contaminate the film's surface and affect print quality.

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.

Cutting

See [3M Instruction Bulletin 4.1](#) for Sheeting, Scoring and Film Cutting details.

Graphic Protection

Graphic protection may improve the appearance, performance and durability of the graphic. Click on the graphic protection options listed in the "Recommended Compatible Products" on page 2 or see the [3M Graphics Market Product Catalog](#), for more information.

Application Tapes

There are two types of application tapes. See [3M Instruction Bulletin AT-1](#) to determine what application tape is recommend for your film or finished graphic.

Premasking Tape

Increases stiffness during application while preventing stretching and damage. Use when little or no liner is exposed. See [3M Instruction Bulletin 4.3](#) for complete details.

Prespacing Tape

Holds cut and weeded letters or graphics in place during application and after removing the film liner, while preventing stretching and damage. Use when large amounts of liner are exposed. See [3M Instruction Bulletin 4.3](#) for complete details.

Application and Installation

In addition to other 3M Bulletins specified in this document, the following Bulletins provide details that you may need to successfully apply a graphic.

- [3M Instruction Bulletin 5.36](#). Application Techniques for Automobiles, Vans and Buses. Complete the 3M Pre-Installation Inspection Record found in this Instruction Bulletin prior to manufacturing or applying a graphic to an automobile, van, or bus.
- [3M Instruction Bulletin 5.37](#). A Guide to Understanding and Applying Graphics to Common Smooth and Textured Wall Surfaces.
- [3M Instruction Bulletin 5.4](#). Application, Fleet Trucks.
- [3M Instruction Bulletin 5.42](#). Application, Special Considerations for Watercraft. Complete the 3M Pre-Installation Inspection Record found in this Instruction Bulletin prior to manufacturing or applying a graphic to a watercraft.
- [3M Instruction Bulletin 5.5](#). Application, General Procedures for Interior and Exterior Dry Application.
- [3M Product and Instruction Bulletin V-Tools](#). 3M™ Vehicle Channel Applicator Tools.

CAUTION

UV inkjet inks may crack if too much heat is used during graphic application to complex curves and deep contours as well as around rivets. When using heat during application, make sure the film surface temperature does not exceed 212° F (100° C). For best results, **always do a test application** of a printed graphic to determine how much heat can be used without damaging the image.

CAUTION

3M recommends using additional heat in the post-application process for vehicle wraps. During this process, 3M only recommends using a heat gun to make sure the film surface temperature reaches a minimum of 200° F (93° C) and does not exceed 225° F (107° C).

CAUTION

For textured walls, 3M only recommends using a heat gun with appropriate application tools to apply the film to the textured surfaces.

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.
- solvent from inkjet ink has not completely dried or cured, which affects both slideability and snap-up.

Working with Air Release Channels

Air release channels are a characteristic of films with Comply™ adhesive. Films designated as Cv3 offer the ultimate in invisible air release channels.

- The channels will be damaged and effective air removal affected if you remove and attempt to change liners or reapply the same liner.
- For the best results, always work from the center out to the edges of the graphic to allow trapped air to exit through the air release channels. If the channels are closed off by firm pressure and air is trapped, use an air release tool to aid in removing air bubbles. See [3M Instruction Bulletin 5.4](#) for details.

Video

Click [here](#) to see how 3M's Comply™ adhesive technology works.

Stretchability

Many finished graphic constructions can be stretched without primer or relief cuts and maintain lift resistance.

- For Automobiles, Vans and Buses, see [3M Instruction Bulletin 5.36](#) for details and exceptions.
- For Straight trucks, semi-trucks and semi-trailers, see [3M Instruction Bulletin 5.4](#) for details and exceptions.

3M™ Tape Primer 94

3M recommends that where the film will be stretched, use primer to maximize a graphic's bond to its substrate.

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). See [3M Instruction Bulletin 6.5](#) for details.

Removal

Removal requires heat and/or chemicals. The ease and rate of removal depends on a number of factors. See [3M Instruction Bulletin 6.5](#) for details.

Shelf Life, Storage and Shipping

Shelf Life

The shelf life is **never more than 3 years** from the date of manufacture on the original box.

If you process the film, the shelf life is changed to **1 year** from the processing date, but not later than the 3 year maximum from the manufacturing date.

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

Shipping Finished Graphics

Flat, or rolled printed side out on 6 inch (15 cm) or larger core. This helps prevent the application tape, if used, from popping off.

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, call 1-800-364-3577 or 1-651-737-6501.

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

Bulletin Change Summary

For the most current 3M Technical Information available to successfully use this product, please view this Bulletin electronically and click on the blue underlined links to view the relevant documents. This Bulletin has been substantially changed to remove warranty information and replace it with references to the new Graphics Warranties website. Please read the entire Bulletin thoroughly.

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Storage, Handling, Maintenance and Removal of Films and Sheetings

1. Table of Contents

2.	Overview	2
3.	Definitions	2
	A. Substrate	2
	B. Surface	2
	C. Film	2
4.	Health and Safety	2
5.	Storage	2
	A. Unapplied Graphics	2
	B. Rolls	2
	C. Cut Sheets	2
	D. Fabricated Sheets: Most Screen Printed or Electrostatically Printed	3
	E. Scotchlite Films 680CR or IJ680CR (all variations)	3
	F. Applied Graphics: On Panels, Sheet Metal, Plastic Sheet, etc.	3
6.	Handling	3
	A. Remove Premask Tape Before Exposing Graphic to Sunlight	3
	B. Temporarily Covering Installed Graphics	3
7.	Maintenance	4
	A. Graphics with a Screen Print Clear or Overlamine	4
	B. Digitally-Printed Graphics with a Clear Coat	4
	C. Power Washing Graphics	4
	D. Automatic Brush Washing	4
	E. Hand Washing Exterior Graphics	4
	F. Hand Washing Interior Graphics	4
	G. Caring for Matte Graphics	5
	H. Removing Difficult Contaminants	5
	I. Graphic Repair	5
8.	Removal Factors	6
	A. Properties of the Film	6
	B. Type of Substrate and Surface	6
	C. Temperature	6
	D. Condition of the Substrate at Application	7
	E. Type and Amount of Ink	7
	F. Type of Overlamine or Clear	7
	G. Age of the Graphic	7
	H. Outdoor Exposure	7
	I. Cut, Torn and Damaged Film	7
9.	Removal Methods for Removable or Changeable Films	7
	A. About Angle of Pull-off and Speed of Removal	7
	B. About Using Heat Sources	8
	C. Unaided Film Removal	8
	D. Heat-aided Film Removal	8
	E. Chemically-aided Film Removal	9
	F. Mechanically-aided Film Removal	10
10.	Removing Adhesive Residue from the Substrate	11
	A. Products Used In Residue Removal	11
	B. General Residue Removal Steps	11
11.	Disposing of Removed Graphic Material	11
12.	3M Related Literature	12
13.	Bulletin Change Summary	12

2. Overview

This bulletin gives you basic procedures for storing, handling, maintaining, and removing films manufactured or sold by 3M Commercial Graphics Division. These procedures help maximize the life of the graphic. Refer also to the Product Bulletins for each product in your graphic construction for specific details that may influence the information in this Bulletin.

DO NOT use these procedures for 3M™ Panaflex™ Awning and Sign Facings. Refer instead to Instruction Bulletin 6.1.

3. Definitions

A. Substrate

The material to which a graphic is applied, such as painted metal or wallboard.

B. Surface

The typography or physical characteristics of the substrate, such as flat, textured or corrugated.

C. Film

Refers to both film and sheeting.

4. Health and Safety

This information is applicable to many of the procedures in this Bulletin. Please read and follow them.



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 go to 3M.com/MSDS, 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.



CAUTION

Any activity performed for a long period of time in an awkward position or with a high amount of force is potentially a risk for causing musculoskeletal strain, pain or injury. When applying graphics, follow these practices to improve comfort and avoid injury:

- Alternate your tasks during the application.
- Schedule regular breaks.
- Perform stretches or do exercises to improve circulation.
- Avoid awkward reaching.

A. Air Quality Regulations

State Volatile Organic Compound (VOC) regulations may prohibit the use of certain cleaning chemicals with VOC's in graphic arts coatings and printing operations. For example, the California South Coast Air Quality Management District prohibits use of certain solvent-based solutions without a permit and other California AQMD's prohibit use of certain solutions without a permit or a regulatory exemption. Check with your State environmental authorities to determine whether use of this solution may be restricted or prohibited.

5. Storage

These values are typical. Refer to your film's Product Bulletin for specific information.

A. Unapplied Graphics

- Clean dry area.
- Away from direct sunlight, excessive atmospheric moisture or humidity.
- Ambient temperatures less than 100°F (38°C) and a relative humidity less than 80%.
- Apply graphics to a substrate within the time period specified in the Product Bulletin of the product(s) you are using.

B. Rolls

- Store horizontally in the shipping carton, with the end caps in place, and covered with the original plastic
- Rolls that have been removed from the carton can be suspended horizontally from a rod or pipe placed through the core.

C. Cut Sheets

- Store cut sheets lying flat.
- Do not stack cut sheets face-to-face.
- Do not apply pressure to stacks of cut sheets.
- Wrap stacks of cut sheets with polyethylene film and seal with tape to prevent moisture absorption by the liner, which can cause the sheets to curl or ripple.

**D. Fabricated Sheets:
Most Screen Printed or
Electrostatically Printed**

Note: Refer to your base film's Product Bulletin to check for any unique details.

- Store and ship sheets lying flat or rolled onto a core.
 - For rolling screen printed graphics, use a core with a diameter of 5 inch (125 mm).
 - For rolling electronically imaged graphics, use a core with a diameter of 6 inch (150 mm) or larger.
 - Wrap the graphic onto the core, graphics-side out. This helps prevent graphics or premask tape from popping off the liner.
- Do not stack cut sheets face-to-face.
- The final color and/or overprint clear must be completely dry before packaging.
- When slip-sheeting is necessary, use 3M™ Easy Release Liner Paper SCW-33 with the shiny side facing the printed graphic. Slip sheeting between graphics is not necessary unless:
 - The protective liner has been printed by the customer.
 - The film has a heat-activated adhesive.

**E. Scotchlite Films 680CR or
IJ680CR (all variations)**

When 3M™ Scotchlite™ Reflective Graphic Films 680CR or IJ680CR are used for cut graphics and 3M™ Prespacing Tape SCPS-55 is applied, store and ship graphics lying flat, only.

**F. Applied Graphics:
On Panels, Sheet Metal,
Plastic Sheet, etc.**

- Protect each layer with 3M™ Easy Release Liner SCW-33 so the shiny side faces the printed graphic.
- If the substrate has been printed or decorated on two sides, protect each side with the liner paper.
- Large graphics should also be padded to reduce the risk of damage.
- Store applied panels on edge.
- Avoid banding, crating or stacking, and corrugated cardboard dividers, all of which put severe pressure on applied graphics.
- Store indoors and keep dry until ready to use. If the packaged graphics become wet, remove the slip sheeting and padding immediately, lay the graphics flat, and allow to dry. Repackage using new, dry materials.

6. Handling

Applied graphics must be handled carefully during shipment and installation to prevent damage to the face of the graphic.

**A. Remove Premask Tape
Before Exposing Graphic to
Sunlight**

Always remove any premask or application tape from the graphic immediately after application. Premask tape left on the graphic after application can quickly and permanently adhere to the graphic when exposed to sunlight.

**B. Temporarily Covering
Installed Graphics**

If it is necessary to temporarily cover installed graphics, which is sometimes called "bagging", use caution to avoid damaging the graphics.

- You may use:
 - Porous cloth covers that are folded over the graphic edges and secured to the back of the graphic work well for one-sided graphics.
 - If porous cloth covers are used for two-sided graphics, secure the cloths to one another, not to the graphic.
 - Any 3M graphic film that includes the word "changeable" in its product name may be temporarily applied over other 3M brand permanent films that have a higher adhesion to the substrate than the bagging film has to the permanent film.

Note: DO NOT bag any graphic applied to 3M™ Panaflex™ Awning and Sign Facing.

- Avoid using:
 - Any type of tape, which can quickly and permanently bond to the graphic.
 - Paper or plastic covers, due to possible plasticizer migration.
 - Ropes or wire fasteners, which may abrade the graphic.

7. Maintenance

A. Graphics with a Screen Print Clear or Overlamine

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.)

B. Digitally-Printed Graphics with a Clear Coat

Use a wet, non-abrasive solution that contains NO solvents and NO alcohol and has a pH value between 3 and 11 (neither strongly acidic nor strongly alkaline.)

C. Power Washing Graphics

Power washing, or pressure washing, may be used. However, aggressive washing can damage the graphic.

Excessive pressure during power washing can damage the graphic by forcing water underneath the graphic. Water lessens the adhesion of the graphic to the substrate allowing the graphic to lift or curl. These problems are magnified by wind. This is a critical problem for perforated window graphic film.

To avoid edge lifting or other damage to the graphics, follow these important steps:

- Use a spray nozzle with a 40 degree wide spray pattern.
- Be sure the spray nozzle includes a nozzle protector (tip guard).
- Use a maximum pressure of 1500 to 2000 psi.
- If the system is heated, limit the water temperature to 180°F (82°C) or less.
- Hold nozzle at least 12 inches (300 mm) away from and perpendicular (90 degrees +/- 10) to the graphic.
- Do not direct the water stream at a sharp angle to the edge of the graphic.



CAUTION

Loose graphics could tear away from a moving vehicle or from a building and cause an obstruction to motorists and pedestrians. After washing, check all the graphics carefully for edge lifting and repair, remove or replace damaged graphics.



CAUTION

To reduce the risk of serious injury from high pressure spray:

- Do not place your hand or body near the nozzle or the spray.
- Do not direct the spray toward anyone else.

D. Automatic Brush Washing

Automatic brush washing may be used, but keep these two points in mind:

- Brushes can catch a loose edge of the graphic and cause further damage to the graphic.
- Brushes can dull the finish of the graphic.

E. Hand Washing Exterior Graphics

1. Flush the graphic with clean water to remove loose dirt particles. A trigger-type hose nozzle is convenient for this purpose.
2. Use a mild liquid detergent and water solution and wash the graphic with a soft brush, rag or sponge
 - Wash thoroughly from the top down.
 - Avoid abrading the graphic by unnecessary scrubbing.
 - After applying the cleaning solution, keep a steady stream of water flowing on the graphic to wash away dirt particles.
3. Rinse the entire graphic thoroughly with clean water. Allow to dry naturally.

F. Hand Washing Interior Graphics

1. Use a mild liquid detergent and water solution and wash the graphic with a soft brush, rag, or sponge.
 - Wash thoroughly from the top down.
 - Avoid abrading the graphic by unnecessary scrubbing.
2. Wipe the graphic with a water-soaked brush, rag or sponge to wash away the detergent and dirt.

Continued on the next page.

3. Dry the graphic with clean toweling.
4. Refer to Removing Difficult Contaminants, above, if necessary.

G. Caring for Matte, Textured or Other Unique Film Finishes

Special care must be taken to avoid abrading or scratching the film. Scratching and abrasion marks may be visible and you may not be able to work them out of the unique finish of the film. To help avoid such damage, avoid using harsh chemicals, brushes or hard scrubbing when cleaning your vehicle, and avoid parking near shrubs and trees or any other items that could scratch the film.

Clean as directed in Step 7.A., above. Rinse thoroughly after cleaning and dry with a clean, soft cloth or soft rubber squeegee to avoid water spots.

Do not apply waxes, polishes, paint or clear coat over these films.

If there is wax and wax residue on the film, remove with an all-purpose cleaner. To help restore the finish of the film, clean it with isopropyl alcohol and water (2:1 ratio).

H. Removing Difficult Contaminants

Some contaminants may remain after following the normal cleaning procedures. Most contaminants can be removed using one of these methods. Other cleaning products and methods should be used only on a customer test-and-approve basis.

1. To remove tar, oil, diesel smut or bituminous material:
 - Wipe with 3M™ Citrus Base Cleaner or a rag dampened with kerosene, mineral spirits, heptane, or VM&P naphtha. Do not use other solvents.
2. To remove pollen and fungus:
 - Wash the graphic with a 3 to 5% sodium hypochlorite (full-strength household bleach) solution or mild liquid detergent and water.
 - Rinse with clean water immediately.
3. To remove crayon, lipstick, or similar materials:
 - Select an appropriate solvent and test it in an inconspicuous area to ensure it removes the contaminant without damaging the graphic. This must be done on a customer test and approve basis.
 - Wash immediately with mild liquid detergent and water, then rinse with clean water.

I. Graphic Repair

Sometimes graphic damage can be repaired; however, **repaired graphics are not warranted**. These procedures are for information only.

(1) Damage to Face of Graphic

1. Trim and clean loose areas of film before patching.
2. Use a film with pressure-sensitive adhesive, if possible. The color or gloss of the new film will vary slightly due to weathering of the original material.
3. Cut the patches so they overlap all sides of the damaged area by at least 1/4 inch (6.4 mm).
4. Position the patch over the damaged area.
5. Hold the patch in place at the top with a strip of Scotch™ Masking Tape.
6. Remove the film's liner.
7. Squeegee the film firmly into place using a plastic applicator.
8. Use a heat gun to heat all edges of the patch, and then re-squeegee all edges.

(2) Edge Damage

1. Trim loose edges back to the point where the adhesive is firmly adhered to the substrate.
2. Apply edge sealing, if desired. Edge sealant may help prevent further damage if the lifting is caused by aggressive washing conditions. Refer to the film Product Bulletin for the appropriate edge sealer.

8. Removal Factors

The terms changeable, removable and permanent simply indicate how easy or difficult it is to remove the film from smooth, flat surfaces, and how much adhesive remains on the substrate. These terms do not refer to adhesive strength. In fact, there are removable products, such as 3M™ Controllac™ Graphic Film Series 180, that have high adhesive strength and long-term durability, yet have other characteristics that make it relatively easy to remove the film.

For the best results, changeable and removable films should be removed within the time period specified in the film's Product Bulletin. Permanent films can be removed with varying degrees of difficulty and success at almost any time. Results will vary when removing any graphic from non-flat, non-smooth surfaces.

Warranted removal rates for fleet applications as part of the 3M™ MCS™ Warranty depend upon: (A) substrates that were in good condition at the time of the application, (B) use of 3M's recommended removal methods; and, (C) notification to 3M no later than five business days after the attempted removal so that 3M may assist in or verify the removal method.

The ease with which a graphic can be removed depends on nine primary factors, listed below. Any one of these factors can significantly affect the speed and ease of removal. Different combinations of factors cause different results. For example, if one of two identical graphics is exposed to more UV light than the other (Factor H., page 7) over the same period of time, the graphic exposed to the most UV light may be more difficult to remove.

It is important to understand and assess each of these factors before estimating the time, labor and related costs for removal.

A. Properties of the Film

3M offers a variety of films to meet various end uses. Generally, these materials can be categorized into four physical types and three adhesive types.

(1) Physical Types

- 2 mil plastic
- 4 mil plastic
- Reflective film
- Urethane

Note: Thicker changeable or removable plastic films and films with an overlamine are the easiest to remove since they will not break and tear under most conditions.

(2) Adhesive Types

There are three categories of adhesive: changeable, removable and permanent. The descriptions assume the film is applied to a recommended and properly prepared sound substrate with a smooth surface. Any other substrate may give other results. Whether a film is removable is largely, but not exclusively, a function of the adhesive.

- Changeable films can be removed without any aids such as heat or chemicals and without leaving adhesive residue.
- Some removable films can be removed with the aid of heat only. Others may require chemicals or accessories. These films leave less than 30% adhesive residue.
- Permanent films are not designed to be removed. In some cases they can be removed, but with great difficulty and likely damage to the substrate. If they are removed, they may leave significant adhesive residue.

B. Type of Substrate and Surface

- The type of substrate and surface to which a particular film is applied can affect both the initial adhesion and ultimate adhesion.
- Graphics applied to a flat surface are the easiest to remove. Surfaces with rivets are more difficult, and corrugated surfaces are usually even more difficult.
- Some substrates are not designed to have graphics removed and removal may damage the substrate. These substrates include unpainted wallboard and some flexible materials.
- Removal is not warranted from substrates that have coatings such as anti-reflection and scratch resistance, which may be damaged by film removal.

C. Temperature

Film becomes brittle in cold weather, causing it to break into small pieces during removal. For the best results, remove film when the temperature is above 40°F (10°C). Generally, the higher the temperature, the better the results. Applying heat will help with most removals, but use care not to damage the substrate with excessive heat.

D. Condition of the Substrate at Application

Removing graphics from substrates that were not in good condition at the time of application may result in substrate damage. We recommend discussing any concerns with your customer if you suspect that damage will result.

- Slightly oxidized (not chalked), painted substrates actually develop a much higher adhesion than newly painted substrates. Such substrates have a texture similar to anodized, bare aluminum, which promotes higher adhesion. Graphic removal may require more effort and is not covered by the fleet applications removal rate warranty.
- However, highly oxidized substrates, such as chalked paint, have poor adhesion and graphics may remove more easily.
- Painted substrates must be dried or cured per the paint manufacturer's recommendations. Graphics that were applied to freshly painted substrates, before the paint had sufficient time to cure, make removal difficult. This is not covered by the application's removal rate warranty. Substrate damage may also occur.

E. Type and Amount of Ink

The type and amount of ink used affects the elongation and tear characteristics of printed film. UV-cured inks tend to be harder and more durable than solvent inks. Thicker and/or more durable inks stretch less so that graphics tear more easily during removal.

F. Type of Overlamine or Clear

Adding an overlaminate or clear (an ink) further affects the elongation and tear characteristics of a graphic. An overlaminated film is thicker and may be easier to remove.

G. Age of the Graphic

Older graphics become brittle and their adhesion to the substrate increases with time. Both of these conditions make removal more difficult.

H. Outdoor Exposure

Exposure to higher temperatures and UV light (sunlight) affects removal. Prolonged exposure to these elements can make the film brittle, changing its tensile strength. This film may tear and break easily, making removal very slow and tedious.

I. Cut, Torn and Damaged Film

Film tears along any cuts or damage so it tends to pull off in small pieces rather than large ones. This makes removal very slow and tedious.

9. Removal Methods for Removable or Changeable Films

Before starting to remove a graphic, read About Angle of Pull-off **and** Speed of Removal and About Using Heat Sources. These sections apply to all removal methods.

If you do not know the characteristics and history of the graphic, try the simplest removal techniques first. The techniques are listed in order from easiest (1) to most difficult (4), starting on page 8.

A. About Angle of Pull-off and Speed of Removal

The angle at which you pull off film is important. It depends on the film and may affect the amount of adhesive residue that remains on the substrate. Changeable and removable films usually require a high angle, such as pulling the film back onto itself, such as for 3M™ Controltac™ Graphic Film 180, IJ3552C, IJ180Cv3 or 8620C. A low angle is recommend for 3M™ Scotchcal™ Perforated Window Graphic Films and removable 3M™ Scotchlite™ Reflective Films and Sheetings. Sometimes the pull-off angle affects the amount of adhesive residue. Experiment with the angle until you get the best removal results. See FIGURE 1.

The speed, or rate, at which you pull off the graphic can affect how much adhesive residue remains on the substrate. Some films can be pulled off quickly, or "snapped" off. Brittle films can sometimes be peeled off slowly.

FIGURE 1
Angle of Pull-Off



B. About Using Heat Sources



CAUTION

Heat or open flames may contribute to a flash fire or burns. Follow these precautions when using a heat source for flame treating.

- Read and follow the instructions supplied with the heat source.
- Avoid personal contact with the heat source. Wear heat-resistant gloves and safety glasses.
- Do not use heat sources near solvent mixtures or residues, or where solvent vapors may be present.



CAUTION

Always provide adequate ventilation to remove emissions that may result from the use of heat. Failure to provide adequate ventilation can result in operator exposure.

Heating a graphic eases removal of almost any film, even films that can typically be removed without aids. Heat softens the adhesive, reducing the pull-off force needed. However, film printed with some UV inks become brittle when using heat unless moisture is also used.

The applicator/remover must determine the appropriate tools, techniques and safety precautions for each situation. For most situations, use a heat source that can raise the applied graphic temperature to 160° to 200°F (72° to 93°C) can be used. Exposure to the sun may be sufficient. Other sources include heat lamps, hot water, industrial heat guns, steamers, hand torches and weed burners.

Each tool has limitations. Heat sources that develop higher BTU can heat larger areas more quickly, but are less safe to use. They also may oxidize or burn painted areas around the graphic, and may emphasize any shadow that remains where the graphic was applied.

Use care not to scorch, burn or otherwise damage the film or substrate when using heat.

(1) Heat Sources on Window Graphics

Certain substrates require lower heat. They are:

- For DuPont Lucite® SAR and GE Plastics Lexan® MRG windows, heat the substrate only to 70° to 100°F (21° to 38°C).
- For glass, heat is not required if the glass window panels are warmer than 60°F (16°C).

(2) Glass Breakage

Important Note!

3M is not responsible for glass breakage due to the application or removal of film, or damage caused to a substrate due to incorrect removal techniques.

C. Unaided Film Removal

Changeable films can be removed without any aids within the time period specified in the film's Product Bulletin.

1. Use a razor, knife or air release tool to lift up a corner of the graphic.
2. Pull the graphic from the substrate. Changeable films usually require a high pull-off angle.
3. If the removal is done in cooler temperatures, heating the graphic and/or cutting it into 12 to 15 inch (300 to 380 mm) wide strips makes removal even easier. Be careful not to damage the substrate.

D. Heat-aided Film Removal

Removable films usually come off with just the aid of heat within the time period specified in the film's Product Bulletin.

Note: Some substrates are heat sensitive. Composites bonded together with foam or adhesive may separate when heat is applied. Before using heat, check to make sure that heat will not damage the substrate.

1. Review the section, *About Using Heat Sources*, page 8.
2. Use a razor, knife or air release tool to lift up a corner of the graphic.

Continued on the next page.

3. Pull the graphic from the substrate. Removable films usually require a low pull-off angle. Some films can be "snapped" off in sections.
4. Score the graphic into 12 to 15 inch (300 to 380 mm) wide strips to make removal easier. Be careful not to damage the substrate.

E. Chemically-aided Film Removal

Chemical aids may be needed for removable films if the film cannot be removed with heat alone. This may occur when the graphic has been exposed to excessive environmental conditions or has remained on the substrate longer than intended.

There are several chemical methods available, many of which require special precautions to use in a safe, environmentally-responsible manner. The user must obtain, read, and follow the MSDS sheet for any chemical used.

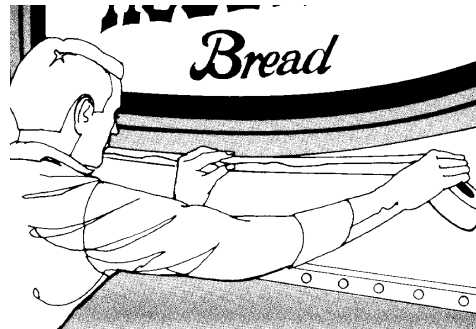
Some chemicals may damage the substrate or its finish. Always test the chemical in a small, inconspicuous area, allowing the chemical to remain on the graphic for the recommended length of time. Remove the film and check for substrate damage.

(1) 3M™ Woodgrain & Stripe Remover System Part No. 08907 and 08908

This remover system may be used on all 3M removable graphic films, except 3M™ Controltac™ Graphic Films with or without Comply™ Adhesive, including 180, 180C, IJ180Cv3, IJ180, IJ180C, IJ180Cv3, IJ380Cv3, 8620, 8620C and 8620Cv3. See page 10 for the recommended system for these films. 3M woodgrain and stripe remover system may not be as effective on graphics printed with UV inks.

1. Follow the manufacturer's safe handling instructions, including wearing appropriate protective equipment such as rubber gloves and safety goggles.
2. Mask around the graphic. This helps protect the substrate from damage.
3. Make a drip tray using wide masking tape that has been doubled over and adhered immediately below the graphic. This prevents residue from dripping around the graphic. See FIGURE 2, below.

FIGURE 2
Making a Drip Tray



4. Spray the graphic lightly with the remover.
5. Cover the graphic with an absorbent material such as paper toweling.
6. Spray the remover onto the toweling until it is thoroughly wetted.
7. Cover the saturated toweling with polyethylene sheeting to retard evaporation, especially if it is warm or windy.
8. Allow the saturated toweling to remain in place for 3 to 4 minutes.
9. Carefully remove the toweling; most of the graphic will be removed with the paper.
10. Spray the remover on the adhesive residue.
11. Allow the remover to work for 3 to 5 minutes.
12. Scrape off the residue with a plastic applicator, cleaning of the tool regularly with toweling.
13. Continue applying the remover to the adhesive, waiting, and scraping, as needed.
14. Remove the masking tape.
15. Rinse the area thoroughly with clean water and dry.

**(2) 3M™ Controltac™ Film
Remover R-221 and
Adhesive Remover R-231**

This remover system is designed specifically for removing 3M™ Controltac™ Graphic Films with or without Comply™ Adhesive that is unprinted or printed with solvent ink. This includes all variations of films 180, 180C, IJ180, IJ180C, 8620 and 8620C. It is not effective on graphics printed with UV inks.

1. Follow the manufacturer's safe handling instructions, including wearing appropriate protective equipment such as rubber gloves and safety goggles.
2. Clean the graphic surface with mild detergent and water. Dry thoroughly.
3. Mask around the graphic. This helps protect the substrate from damage.
4. Make a drip tray using wide masking tape that has been doubled over and adhered directly below the graphic. This prevents residue from dripping around the graphic. See FIGURE 2.
5. Thoroughly coat the graphic with film remover R-221, using a paint brush or roller. The coverage rate should be 150 square feet per gallon.
6. Allow to dry for at least 15 minutes at room temperature or warmer. Leave it on for a longer time in cooler temperatures.
7. Test removability by grasping a corner of the graphic and pulling it from the surface at a low angle--less than 90 degrees. The film should come off with low to moderate force. It should stretch and remove easily.
 - If the film is still too brittle, apply a second coat, let dry, and repeat the removal test.
 - If the film removes easily, continue with Step 7.
8. Remove the masking tape but leave the drip tray in place.
9. Spray adhesive remover R-231 onto areas where there is adhesive residue.
10. Allow the liquid to penetrate for 30 to 60 seconds.
11. Remove the adhesive by scraping with a plastic applicator or rivet brush. Wipe the loosened residue with a cloth saturated with adhesive remover. Repeat this procedure as needed.
12. Remove the drip tray.
13. Clean the entire surface with a solvent wipe and follow with a mild detergent and water wash.
14. Dry the surface.

**F. Mechanically-aided Film
Removal**

Note: Damage to the substrate caused by mechanical removal of graphics is not covered by the 3M™ MCST™ Warranty.

Most mechanical removal techniques result in substrate damage. Tools such as scrapers, abrasive wheels and particle blasting devices are difficult to control in a way that removes only the graphic. You may want to consider using these tools if the substrate will be repainted or refinished after graphic removal.

The following recommended tools are not suitable for graphics covering large areas. They work best on removing stripes, small letters or graphics or the outside edges from large graphics.

(1) 3M™ Stripe Off Wheel

The Stripe Off Wheel has a solid 5/8 inch thick wheel and is the best tool for removing the edges of a graphic. It does not scratch or damage acrylic enamel or urethane paint. It is designed to be used with common 3/8 inch pneumatic and electric tools with a 500 to 4,000 RPM speed range. The optimum performance is 2000 +/- 200 RPM.

The Stripe Off Wheel is sold by 3M Automotive Aftermarket Products and Systems Division and is listed in their catalog.

- Part number 051131-07498: Stripe Off Wheel and 3/8 inch mandrel (5 per package)
- Part number 011131-07499: Stripe Off Wheel without the attachment hardware (5 per package)

(2) **3M™ Scotch-Brite™ Large Area Stripe Removal (LASR) Disc Assembly**

The LASR disc has stacked, solid wafer construction, 8 inch x 5/8 inch. It is designed to be used with the Black and Decker Buffmaster #6138, a variable speed buffer with a 1500-3000 RPM speed range. It has a larger contact area than the Stripe Off Wheel, so removal may take less time. This tool does not scratch or damage acrylic enamel or urethane paint. Systems Division and it is listed in their catalog.

The LASR disc is sold by 3M Automotive Aftermarket Products and Systems Division and is listed in their catalog.

- Part number 051131-07517: LASR disc assembly for 5/8-11 shaft
- Part number 011131-07519: adapter for attaching a LASR disk assembly to a 5/8-11 external shaft

10. Removing Adhesive Residue from the Substrate

A. Products Used In Residue Removal

- 3M™ Citrus Based Industrial Cleaner
- 3M™ Woodgrain and Stripe Adhesive Remover 08908
- 3M™ General Purpose Adhesive Cleaner 08984 (several sizes are available)
- 3M™ Adhesive Remover R-231 for Controltac™ Film
- Xylol (xylene)

B. General Residue Removal Steps

These steps may vary depending on the product you are using.

1. Read the manufacturer's instructions for the adhesive remover product. Use the product only as directed and only in a well-ventilated area.
2. Follow the manufacturer's safe handling instructions, including wearing appropriate protective equipment such as rubber gloves and safety goggles.
3. Test the remover by applying in an inconspicuous area to make certain that it does not damage the substrate.
4. Apply the remover as directed and allow the prescribed time for the chemical to penetrate the adhesive.
5. Remove the softened adhesive by scraping with a plastic applicator or rivet brush.
6. Pick up the loosened adhesive with a cloth saturated with the adhesive remover.
7. Repeat steps 4 through 6 as needed.
8. After the residue is removed, clean the entire surface with a solvent wipe and then wipe dry with clean toweling before the solvent evaporates.
9. Wash the entire substrate with a solution of detergent and water.
10. If you are applying a new graphic, dry the substrate thoroughly with a clean, lint-free towel.

11. Disposing of Removed Graphic Material



CAUTION

Adhesive or film removers, and solvent wipes or film wetted with the removers, should be incinerated in a permitted hazardous waste incinerator. Since regulations vary, consult the applicable regulations or authorities before disposal.

12. 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 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	Type	Bulletin No.
Base Films and Substrates Please visit our website to identify and select the additional Product and Instruction Bulletins you need for a successful application.		
Cleaning and Repairing Decorated Awning and Sign Facings	IB	6.1
3M Graphics Center Warranty Brochure	go to www.3Mgraphics.com , Warranties	

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13. Bulletin Change Summary

Added information on the maintenance of matte film graphics in Section 7.G.



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