Overview

This bulletin provides details of various cutting techniques applicable to 3M graphic films. Topics covered include general cutting guidelines, types of cutting, and various cutters and equipment. Additionally, content specific to 3M films and their liners provides detailed information on cutting specifications and limitations users should follow to help ensure successful graphics manufacturing. This includes character height limitations for certain films, as well as details as to which 3M films are or are NOT compatible with certain cutting methods. Common issues with cutting are also addressed in the "Troubleshooting" table on page 9.

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General Cutting Guidelines

The information contained and techniques described herein are believed to be reliable, but 3M makes no warranties, express or implied, including but not limited to any implied warranty of merchantability or fitness for a particular purpose.

Cutting Sizes

- Letters or designs cut smaller than recommended may be difficult to cut and weed. See the "Recommended Minimum Cutting Sizes for Letters and Symbols" table on page 8 for letter height, stroke width, and point radius guidelines.
- Small or thin serifs and thin graphic lines may not adhere to the substrate sufficiently, and are not suitable for fleet applications.
- Users should determine their own cutting and weeding capabilities based on variations in equipment and font characteristics.
- Cut the film or graphic film-side up.
- Round the inside corners of letters and symbols using the largest radius that produces an acceptable appearance. This reduces the possibility of stress cracking and tearing.

Cutting Tool Maintenance

- Keep all cutting tools sharp and clean to minimize the possibility of adhesive transfer and damage to the graphic.
- Reflective films and sheetings are abrasive and reduce the sharpness of cutting tools faster than other films.
- Do NOT use heavy pressure or the blade will overheat.
- Do NOT use mold release agents or oils on the cutting surface. They can contaminate the adhesive and prevent the graphic edge from adhering properly.

Scoring

Film liners generally do NOT require scoring. If scoring is desired, print the graphic and then use a mechanical device to score the liner.

To minimize instances of the liner popping off of engineer grade reflective sheeting when scoring:

- Do NOT score the liner of die cut letters.
- Score at least 1 in. (2.5 cm) away from the film edge. If scoring must occur closer than 1 in. (2.5 cm) from the film edge, test the processing procedures and use conditions to determine if the results are satisfactory.
  - Request pre-scored film with a minimum of 3 in. (7.6 cm) between cuts.

Hand Cutting

Single sheets can be hand cut with a paper cutter, scissors, or a razor blade.

Guillotine Cutter

General Information

Use a guillotine-type cutter to cut a large volume of straight edges. The type and condition of the cutter and blade, and the technique used determines the accuracy and quality of the cut.

- Use sharp blades. Blades used an average of 8 hours or more per day should be re-sharpened every ten days.
- Use cardboard inserts as counters in larger stacks. Include the thickness of the inserts as a part of the total stack height.
- Prevent cracking of certain films by using a double cut. Put the waste portion of the stack against the bevel edge of the blade. See Figure 4.

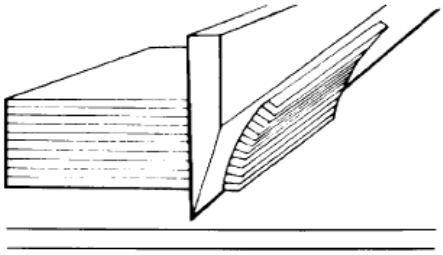


Figure 1. Cutting Stacks of Film

Keep Blades Clean

- Clean all adhesive buildup from the blade with a cloth soaked in mineral spirits, then dry the blade thoroughly. Always do this in a well-ventilated area.
- To minimize adhesive ooze on films with soft adhesives:
  - Do NOT double cut because ooze forms primarily on the flat side of the blade.
  - Keep the blade clean and sharp.
  - Cut in short stacks.
  - Minimize the clamp bar pressure. To avoid jogging the sheets, stop cutting if the adhesive oozes. To remove oozed adhesive, apply a piece of Scotch™ Masking Tape to the cut edge, and then pull off the tape to remove the ooze.

Table A. Cutting Recommendations for Guillotine Cutter

Type of Film	Recommendations
Vinyl Films	4 in. (10.2 cm)
Non-PVC Films	4 in. (10.2 cm)
Polyolefin Films	4 in. (10.2 cm)
Enclosed Lens Reflective Sheeting	50 sheets, double cut
Prismatic Reflective Sheeting	25 sheets, double cut[1]

[1] Keep the clamp bar pressure at a minimum to avoid crushing the cells.

Cold Die Cutting

Steel Rule Dies for Cold Die Cutting

Steel rule dies for cold die cutting are made from standard single or double bevel steel rules that are 1 in. (2.5 cm) high and 1/32 in. (0.8 mm) thick. They are hand bent and mounted in 3/4 in. (1.9 cm) plywood or hardboard. The straight edge of the single bevel rule goes against the finished cut of a graphic. Small pieces of sponge, rubber, or cork attached to the board on each side of the steel rule prevent the film from sticking to the rule. See Figure 5.

Table B. Cutting Recommendations for Cold Die Cutting

Type of Film	Steel Rule
Vinyl Films	Yes
Non-PVC Films	Yes
Polyolefin Films	Yes
Urethane Film	Not recommended
Commercial Reflective Films	Yes
Enclosed Lens Reflective Films	Yes
Prismatic Reflective Sheeting	Not recommended[1]

[1]Use hot die cutting to help ensure a quality cut and prevent the possibility of edge cracking.

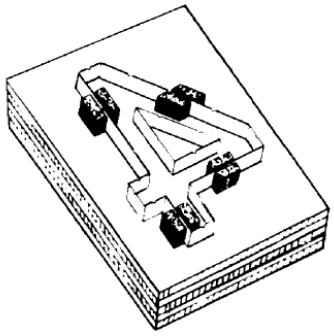


Figure 2. Using Steel Rule Dies

Table C. Cutting Recommendations for Cold Kiss Cutting

Type of Film	Steel Rule
Vinyl Films	Test and approve
Non-PVC Films	Test and approve
Polyolefin Films	Test and approve
Urethane Films	Not recommended
Commercial Reflective Films	Test and approve
Enclosed Lens Reflective Films	Not recommended
Prismatic Reflective Sheeting	Not recommended

Hot Die Cutting and Thermal Kiss Cutting

NOTE

3M does NOT recommend cutting any of its film via the thermal kiss cut method *except* 3M™ Scotchcal™ ElectroCut™ Graphic Film 7125. See Table E below for details. Any product not listed in Table E on page 9 is to be used with a thermal kiss cutting method strictly on a user test-and-approve basis.

Steel Rule Dies for Hot Die Cutting

Steel rule dies for hot die cutting are made from single or double bevel steel rules that are 3/8 in. (9.5 mm) high and 1/32 in. (0.8 mm) thick. They are mounted in 1/4 in. (6.4 mm) hardboard or tempered aluminum. This is NOT a standard construction and must be specially requested from the manufacturer. The material mounted on each side of the die to prevent the film from sticking to the rule must be made of cork or another heat-resistant material.

Etched Dies

- Etched dies are made from zinc, magnesium, or copper by photoengravers and/or die makers. They are primarily used for graphics with lettering or designs for which it is very difficult to manufacture a steel rule die, or where the job size does not warrant the extra cost of steel rule dies.
- Die plates are 1/4 in. (6.4 mm) thick. Standard techniques etch the plate to approximately 1/32 in. (0.8 mm) thick. The life of a zinc die can be greatly extended by chrome plating.
- Use a 1/16 in. to 1/8 in. (1.6 mm to 3.2 mm) thick piece of rubber or similar material on the bed, rather than the normal steel cutting plate. The material prevents damage to the die during make-ready.

Cutting Recommendations for Hot Die and Thermal Kiss Cut

- Follow the recommendations in Table D on page 8 for minimum letter size, stroke width, and radius point. Letters or designs smaller than these recommendations may be difficult to cut or weed. The quality of the cut will also affect the durability of the graphic.
- Excessive heat and/or pressure causes a ridge to form at the cut.
  - Ridges may damage the adhesive edge or prevent the adhesive from making good contact. Either can cause edge lifting of the film.
  - The application tape may not have a good bond to the graphic, making part pick up difficult.
  - The film can become embedded in the liner making part pick up difficult.
- Do NOT hot die or thermal kiss cut films with a heat-activated adhesive.
- Purchase dies with a release coating to reduce sticking of the graphic and to obtain a cleaner cut.
- Use a steel rule die if the film has an application tape.

Electronic Cutting

Electronic cutting is the process of cutting adhesive-backed film with computer-driven knives, otherwise known as computer aided sign making. The device that performs the cutting operation is referred to as either a plotter or a cutter. This document uses the term “cutter” to refer to all types of plotters and cutters.

All 3M Graphics films can be electronically cut. However, each film has different minimum cutting heights, minimum stroke widths, and ease of weeding. See “3M Films Designed for Electronic Cutting*” on page 6 for additional details.

The proper cutting depth should result in the liner being lightly scored. Too deep a cut increases knife wear and material lifting during cutting, and can cause a paper or polycoated liner to split. Too light a cut may not fully cut through the film and adhesive, which can make weeding difficult.

Technically, all films can be electronically cut. However, films specifically designed for electronic cutting include a special release agent between the liner and the adhesive that allows for optimum cutting and weeding.

It is important to understand the differences between die cutting and kiss cutting.

- Die cutting cuts through both the film and the liner.
- Kiss cutting cuts through only the film and adhesive, leaving the liner uncut.

Types of Cutters

Sprocket Fed or Pin Fed Cutters

Sprocket and pin fed cutters accept 15 in. or 30 in. (38.1 cm or 76.2 cm) wide material. Both edges of the film are punched with a hole pattern that matches to pins on the cutter’s drive wheels. These wheels pull the film through the cutter. With these cutters, the film moves back and forth, while the knife head moves side to side and changes directions.

These cutters are convenient for smaller shops, provide accurate tracking, and work at an increased speed compared to other cutters. However the cutters do require that the film has holes punched in both sides, and even then usable material widths are limited.

Friction Fed Cutters

Friction fed cutters accept 4 in. to 60 in. (10.2 cm to 152.4 cm) material widths. This type of cutter uses a two wheel drive system to move unpunched film. The bottom wheel is usually knurled and acts as a drive wheel, while the top wheel is plain rubber. Film is pulled through the cutter by being pinched between the wheels. With these cutters, the film moves back and forth, while the knife head moves side to side and changes directions.

These cutters can handle a wide variety of film widths, and while they do not require punched film they can still use it. However the process by which the cutter moves film can result in film slipping, resulting in inaccurate cuts, particularly when long or numerous cuts are required.

Flatbed Cutters

Flatbed cutters are considered to be the standard of electronic cutters. The cutter uses a vacuum to hold the film in place during cutting, with sizes ranging from 2 ft. by 3 ft. (61 cm by 91 cm) to 8 ft. by 10 ft. (2.4 m by 3 m). Flatbed cutters use a knife head that moves back and forth across the flatbed area, and the knife blade changes directions.

These cutters produce the most accurate cuts since the film does not move. They do not require punched film, but they can still use it. For larger graphics, flatbed cutters can advance film automatically after a panel has been cut. These cutters require a large work area, and are expensive compared to the other types of cutters detailed in this document.

Cutting Heads

Two standard types of cutting heads are used in computer aided sign making. They are easily distinguished by their cutting methods.

Tangential

A tangential cutter head uses a servomotor. This type of head moves the cutting blade around the pattern using a drop, cut, lift, and turn method each time the design changes direction. The only exceptions are the letter O and the numeral 0, which are cut in one continuous movement. As an example, the blade cuts, lifts, and turns 12 times when cutting an upper case letter H in Helvetica type face.

Following/Tracing

A following or tracing cutter head uses bearings that allow the blade to swivel in a holder. With this mechanism, the blade drops into the first position and traces around the design without lifting until it has returned to the starting position.

Knife Blades

There are several types of knife blades ranging from dual edge 40 degree blades for cutting standard electronically-cuttable films, to a single edge 60 degree blade for finer detail cutting and for cutting thicker materials. Blades are referred to in terms of degrees since cutting depth is determined by the angle of the intersection of the cutting edge and the shaft. Users should refer to their cutter's instruction manual to determine the types of blades that can be used and the required pressures.

Keep all cutting tools sharp and clean to minimize adhesive transfer and damage to graphics. Installers having difficulty weeding vinyl, or who are observing a decrease in cut quality, should inspect the blade for chips along the cutting edge and other damage. Performing a manual test and a cutter force test is important to confirm if a blade is dull. If the cut path isn't clean and sharp, or if the pattern is hard to weed, the blade may be dull.

Do NOT use heavy pressure or the blade will overheat and cause the plotter to stop. Reflective films, paint protection films, polyester films, and metal flakes in metallic films are abrasive and reduce the sharpness of the cutting tool at a faster rate than other films. The lifespan for plotter blades depends on how much vinyl and what type of materials are cut. Cutting too deeply into paper release liners accelerates normal wear, dulling the tip and making weeding more difficult.

A buildup of vinyl debris in the blade holder can interfere with proper blade rotation and cause poor cutting. Do NOT use mold release agents or oils on the cutting surface as they can contaminate the adhesive and prevent the graphic edge from adhering properly.

3M Films Designed for Electronic Cutting*

The following films are the most popular 3M films for electronic cutting. Refer to 3mgraphics.com for details on additional films.

- 3M™ Scotchcal™ Graphic Film Series 50
- 3M™ Controltac™ Graphic Film Series 180mC
- 3M™ Scotchlite™ Reflective Graphic Film Series 680
- 3M™ Scotchcal™ Translucent Graphic Film Series 3630
- 3M™ Envision™ Translucent Film Series 3730
- 3M™ Scotchlite™ Reflective Graphic Film Series 5100
- 3M™ Scotchlite™ Reflective Graphic Film Series 5100R
- 3M™ Scotchcal™ ElectroCut™ Graphic Film Series 7125
- 3M™ Scotchcal™ ElectroCut™ Graphic Film Series 7725
- 3M™ Scotchcal™ ElectroCut™ Graphic Film Series 7725SE-400
- 3M also manufactures several films designed for use with Gerber Scientific products which are sold exclusively by authorized Gerber distributors. Visit Gerber's website at www.gspinc.com to find a distributor.

* Product availability varies by region. Contact a local sales representative or application engineer for details.

Liners

Films designed for electronic cutting are available on a kraft paper liner, a polycoated paper liner, or a synthetic liner, depending on the film series. Liners for films specifically designed for electronic cutting include a special release agent between the liner and the adhesive, allowing for optimum cutting and weeding.

Films with a synthetic liner offer important advantages in production environments where size, accuracy, and speed are important.

Lay-flat

The synthetic liner does not absorb moisture so it stays flat when it's on a flatbed cutter. It will also stay flat when it has application tape applied, or when it is stacked. The lay-flat feature helps prevent complete cut-through of the liner, thereby preventing knife and bed damage. On friction fed cutters, there is no liner growth due to moisture absorption, which helps prevent tracking problems on long jobs. The lay-flat feature also helps ensure graphics don't pop off their liners during storage.

Excellent Cutting

The unique properties of the synthetic liner allow cutting heights of 1/4 in. (0.6 cm) or possibly even smaller with proper cutter adjustments on a user test-and-approve basis. This allows for a greater variety of graphics. In addition, a synthetic liner won't split in the same way as a paper liner does if a cut is too deep.

Faster Weeding Speed

Letters are less likely to lift away during weeding because of how the adhesive sticks to the liner, so graphics can be weeded more quickly.

Water Resistance

If a paper liner gets wet it splits and becomes difficult to remove cleanly. Water may also damage the graphic as a result. A synthetic liner does not absorb water.

Multi-Color Assembly

Synthetic liners are transparent, making it easier to register graphics on jobs requiring multiple colors. The applicator can clearly see each color when overlaying them, providing 100% confidence in the graphic. The multicolor lay up also enables assembly of the entire graphic on a single piece of liner with a single sheet of application tape, saving material costs and application labor.

Anti-Static Properties

The synthetic liner has a built-in antistatic treatment that helps protect nearby electronic circuitry from the risk of static discharge. Static discharge can cause cutters to shut down in the middle of a cut, damaging the cutter and the graphic. This antistatic feature also helps protect users from shocks while weeding.

Cutting Depth and Pressure

The proper cutting depth results in the liner being lightly scored. Set the blade depth in the blade holder properly, with the tip of the blade barely visible. Always confirm the total thickness of the film and the film's adhesive prior to starting a cutting job.

The purpose of scoring the liner is to ensure the blade has cut completely through the adhesive. Too deep a cut can cause liner splitting, increased knife wear, and material lifting during cutting. It can also cause the release liner to adhere to the back of the film, causing delamination and making the film much more difficult to weed. Cutting too lightly can cause incomplete cutting of the film and adhesive, making weeding difficult.

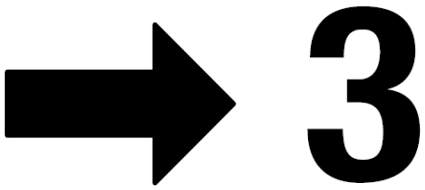
Set the cutter's force and perform a test cut, including weeding the pattern and examining the liner. If the liner has deep cuts, or if the cut line can be felt on the back of the release liner, too much force was used. Reduce the force setting and re-test until the pattern is easy to weed and the cuts can't be felt from the back of the liner.

Weeding

Weeding is the removal of unwanted film. Weed films as quickly as possible after cutting. Use extra care when weeding films with Comply™ adhesive, as if it is mistakenly pulled off, it cannot be reapplied to the liner without effecting the Comply™ air release channels.

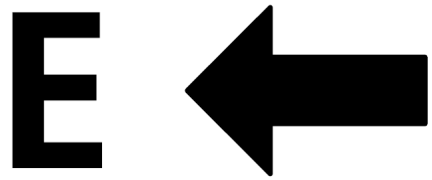
Before weeding, inspect each element (letters, numerals, etc.) to determine if the film is completely cut through, and to identify which side has the most open cuts. Start weeding from the side with the most open cuts. This makes weeding easier and reduces the chance of unintentionally removing an element.

For example, most numerals have more open areas on the left side, so weed from left to right. Conversely, most letters have more open areas on the right side, so weed from right to left.



Open cuts of numerals are generally on the left.

WEED FROM LEFT TO RIGHT



Open cuts of letter are generally on the right.

WEED FROM RIGHT TO LEFT

Figure 3. Weeding Directions

Electronically-cut Graphics Require Application Tape

Electronically-cut graphics generally require the use of an application tape after cutting. The application tape protects the graphic during storage, transport, and application. It also allows installers to apply graphics in one piece. Because application tape has a lower adhesion to the film than the film has to the substrate, the tape can be removed after graphics are applied without altering the registration.

Refer to 3M Instruction Bulletin Application: 3M™ Application Tapes for Graphic Films to identify the correct application tape for a specific graphic construction.

Letters and Symbols

The recommendations in the following table are designed to reduce problems in (a) cutting and weeding; (b) removing the application tape and film from the liner; and (c) removing the application tape from the film after the letters have been applied to the substrate. Smaller dimensions are to be used strictly on a customer test-and-approve basis, with the understanding that such graphics are NOT warranted by 3M. See 3M Instruction Bulletin Application: 3M™ Application Tapes for Graphic Films for more information on application tapes.

These values are based on Helvetica font for upper- and lower-case copy.

Table D. Recommended Minimum Cutting Sizes for Letters and Symbols

Type of Film	Liner Feature	Adhesive Feature	Letter Height *in. (mm)*	Stroke Width *in. (mm)*	Radius[1] *in. (mm)*
2 mil vinyl film	Synthetic, heavy weight	-	0.25 (6.35)	0.04 (1.02)	0.024 (0.61)
	Paper	-	0.375 (9.52)	0.04 (1.02)	0.024 (0.61)
	Polycoated	-	0.5 (12.7)	0.05 (1.27)	0.024 (0.61)
	Polycoated	Repositionable	3.0 (76.20)	0.25 (6.35)	0.125 (3.18)
	Polycoated	Air release channels	3.0 (76.20) Flat bed dual edge blade 6.0 (152.40) Friction fed cutter	0.25 (6.35)	0.125 (3.18)
3-4 mil vinyl film	Polycoated	-	0.5 (12.7)	0.09 (2.29)	0.050 (1.27)
	Polycoated	Repositionable	3.0 (76.20)	0.25 (6.35)	0.125 (3.18)
	Polycoated	Air release channels	3.0 (76.20)	0.25 (6.35)	0.125 (3.18)
	Paper	-	0.5 (12.7)	0.25 (6.35)	0.125 (3.18)
Vinyl film with sidewalk or floor overlaminate	Polycoated	-	Not recommended for letters or symbols		
Non-PVC	Polycoated	Air release channels	3.0 (76.20)	0.38 (9.52)	0.063 (1.60)
Polyolefin film	Polycoated	Repositionable	Not recommended for letters or symbols		
Enclosed lens retroflective film	Polycoated	-	3.0 (76.20)	0.38 (9.52)	0.063 (1.60)
3M™ Scotchlite™ Reflective Graphic Films 5100, 5100R, IJ5100, IJ5100R					
Enclosed lens retroreflective film	Polycoated	Slideable	1.0 (25.40)	0.38 (9.52)	0.063 (1.60)
3M™ Scotchlite™ Reflective Graphic Films 680, IJ680					
Enclosed lens retroreflective film	Polycoated	Air release channels	1.0 (25.40)	0.38 (9.52)	0.063 (1.60)
3M™ Scotchlite™ Reflective Graphic Films 680CR, IJ680CR					
Prismatic reflective sheeting	Paper	-	3.0 (76.20)	0.50 (12.7)	0.125 (3.18)
	Synthetic, lightweight	-	Not recommended for letters or symbols		

[1]This dimension refers to the inside corners of letters and symbols.

Table E. Cutting Recommendations for 3M Films*

3M Film(s)	Cutting Methods					
	Band Sawing	Hand Cutting	Guillotine	Cold/Hot Steel Rule Die Cutter	Electronic Cutter	Thermal Kiss Cut
7725	X	X	X	X	X	
7125	X	X	X	X	X	X
180 Series	X	X	X	X	X	
3650	X	X	X	X	X	
3690LF	X	X	X	X	X	
3690C	X	X	X	X	X	
1000LF	X	X	X	X	X	
1000C	X	X	X	X	X	
8000LF	X	X	X	X	X	
220	X	X	X	X	X	
225	X	X	X	X	X	
7725SE	X	X	X	X	X	
SC50	X	X	X	X	X	

* Use of all other cutting methods, and the use of 3M films with cutting methods not recommended for those films as specified in Table E, are to be performed strictly on a user test-and-approve basis.

Troubleshooting

Table F. Troubleshooting

Problem	Cause	Solution
Film won't track on friction fed cutter.	Friction feed system is dirty or out of tolerance	Clean all rollers and feed mechanisms. Adjust spring tension on pinch rollers. Contact the manufacturer.
Sensors don't recognize a black film.	The sensors on most cutters read light reflected from the liner. When all the light is absorbed, the machine believes there is no film loaded. This usually happens with black film because the light shines through the liner and is absorbed by the black film, indicating an empty cutter.	Block the sensors with white tape or paper. Turn off the sensors and put the machine in manual mode (if available).
Poor cutting and weeding	Poor cutting and weeding is rarely a film problem. It is usually the result of poor cuts and non-closure of corners, indicating a cutter or knife problem.	Ensure the cutting pattern is accurate. Check the blades. Adjust the knife. Adjust the cutter. Contact the manufacturer, providing samples for evaluation.
Graphics remain on the liner when removing the application tape.	Using the incorrect application tape	Use a higher tack tape.
	Incorrectly removing the application tape	Wipe the tape with a 70% isopropyl alcohol and 30% water solution. Gently heat the application tape with a heat gun to adhere the application tape to the graphic.
Application tape won't stick to the liner.	Using the incorrect application tape	Refer to the base film's product bulletin or 3M Instruction Bulletin Application: 3M™ Application Tapes for Graphic Films to determine the correct application tape for the graphic.
Static problem	Static build up in product manufacture and shipping	Install the cutter's grounding cable, ensuring the stripped wire ends make metal to metal contact. It may be necessary to strip off some paint from the base of the cutter stand to achieve this. Drape a piece of static string so it makes contact with the vinyl as it rolls through the cutter. Secure the string at either end of the cutter with the string's magnets.
Application bubbles	Application technique	Small bubbles disappear over time. Consider using a film with Comply™ adhesive.
Liner won't tear.	Synthetic liners cannot be torn.	Cut the liner with a knife or scissors.
Liner takes up too much room in the trash.	Not properly prepared for disposal	Roll up the liner before disposal.

Problem	Cause	Solution
Difficulty weeding small graphics from a synthetic liner	Slipping of liner during weeding	Tape down one edge of the graphic. Try weeding the graphic while it is still on the vacuum table, if possible.
Logo from the liner visibly transfers to the film surface.	Pressure and heat from the storage and shipping process leaves an imprint of the logo on the film.	The logo will eventually disappear after application.

Sales and Technical Service

Contact a 3M sales representative or application engineer to discuss specific electronic cutting needs.

3M Related Literature

Read the most current 3M product and instruction bulletins before starting any job.

The information in 3M product and instruction bulletins is subject to change. Current bulletins are available at 3M.com/graphics. 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 sections of the product bulletins of all 3M components used.

- 3M Instruction Bulletin Production: Backlit Signage
- 3M Instruction Bulletin Production: Graphic Design, Handling, and Storage
- 3M Instruction Bulletin Application: 3M™ Application Tapes for Graphic Films
- 3M Instruction Bulletin Application: Backlit Signage
- 3M nstruction Bulletin Application: Signage
- Refer to 3M Graphics Technical Information to find relevant product bulletins for products used.

Health and Safety

Tools and Equipment Usage

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

Chemicals

When handling any chemical products, read the manufacturers' container labels and the Safety Data Sheets (SDS) for important health, safety, and environmental information.

Follow this link to obtain SDS sheets for 3M products.

Follow this link to obtain information about substances of very high concern (SVHC) for EU products.

Warranty Information

Technical Information

Technical information, guidance, and other statements provided by 3M are based upon records, tests, or experience that 3M believes to be reliable, but the accuracy, completeness, and representative nature of such information is not guaranteed. Such information is intended for people with knowledge and technical skills sufficient to assess and apply their own informed judgment to the information. No license to any intellectual property rights is granted or implied with respect to this technical information.

Product Selection and Use

Many factors beyond 3M's control and uniquely within user's knowledge and control can affect the use and performance of a 3M product in a particular application. Customer is solely responsible for evaluating the product and determining whether it is appropriate and suitable for customer's application, including conducting a workplace hazard assessment, reviewing all applicable regulations and standards, and reviewing the product label and use instructions. Failure to properly evaluate, select, and use a 3M product in accordance with instructions or to meet all applicable safety regulations may result in injury, sickness, death, and/or harm to property.

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