Overview

Low volatile organic compounds (VOC) paints are driving change in wall film applications. The chemistry of paints has been changed over the years to drive down VOC levels due to both sustainability efforts and regulatory requirements. As a result, newly painted surfaces interact differently with film adhesive, affecting the films' ability to adhere to the paint.

Simple steps can maximize film adhesion. Because paint formulations are protected trade secrets, it is difficult for any film manufacturer to understand how film adhesives interact with these paints. Extensive testing has determined there is no single film or adhesive that works “best” on each paint tested. Any given film can perform well on one paint and poorly on another. However, installers can use the 3M™ Enhanced Adhesion Cleaning Method and the 3M™ Adhesion Test Kit to test the film's adhesion to the walls and help them successfully select the correct 3M graphic film for a given wall application.

Reading and following the techniques in this bulletin can be the difference between a successful installation and a graphic that falls off the wall prematurely.

Table of Contents

Wall Textures and Compositions

NOTE

Do NOT use 3M's films on textured walls with loose surfaces, such as loose sand-textured blocks. The texture should be more firmly anchored, like sandpaper.

Common Indoor Wall Compositions

Brick. A kiln-dried, hard clay surfacing material, thicker than tile, for indoor or outdoor walls. Inherently smooth, but may be patterned or textured before firing. Usually has grout lines.

Concrete. A building material made from a mixture of portland cement, water, and fine and coarse particles. Texture can range from smooth to heavy.

Concrete masonry unit (CMU). A usually hollow building block made with concrete. May be painted or unpainted. Texture is usually medium. Usually has grout lines.

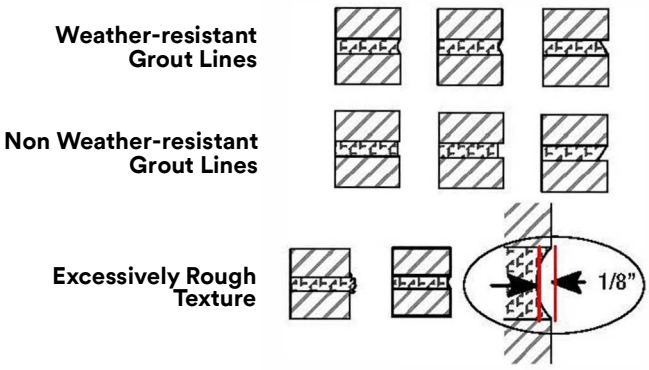


Figure 1. Grout Line Examples

Grout lines (mortar joints). A concrete or composite product used to hold together building materials such as concrete blocks and brick. Such lines can range greatly in width, depth, profile, and texture. 3M films for textured walls work best if the grout lines are not more than 1/8 in. (3.2 mm) deep, and are flush, concave, or V-shaped. Excessively rough texture, excessively steep elevation changes—such as Raked—or an undercut profile—such as Weathered or Struck—generally result in challenging applications that may not achieve the desired results. The "Mosaic Graphic Technique" on page 9 is the most effective way to manage film in excessively deep grout lines.

Painted wallboard. A type of board made from wood pulp, plaster, or another material (used for covering walls and ceilings) that has been primed, painted and thoroughly dried. Textures vary depending on the sanding and painting techniques used.

Stucco. A cement or plaster mixture that is hand or machine applied to indoor or outdoor walls. The example images below vary between smooth and medium textures, although stucco textures can range from smooth to heavy.

Tile. A kiln-dried, thin, hard, clay surfacing material for indoor or outdoor walls. May be glazed or unglazed. Texture is usually smooth or a smooth base with an irregular pattern of light texture. Usually has grout lines.

Common Wall Finishes

Vinyl or paper wallcovering. A thin to heavyweight material used to cover indoor walls. Texture can range from smooth to heavy and may or may not have a visible pattern, such as geometric shapes. These materials may contain plasticizers that migrate to the surface and can cause premature film adhesion failure.

NOTE

Film intended for use on textured walls but applied to any vinyl or paper wall covering or wallboard typically also pulls off the wall covering or wallboard paper during removal. Use at your own risk.

Paint. Refer to 3M Instruction Bulletin Application: Substrate Selection and Preparation.

Glaze, varnish, or other surface sealant. A product applied to a wall to provide color, gloss, protection, and/or cleanability.

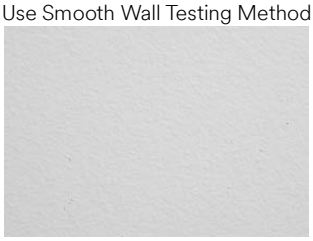
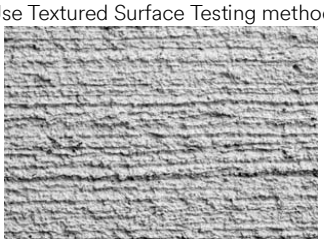
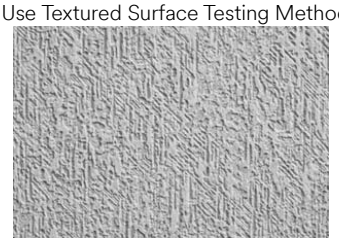
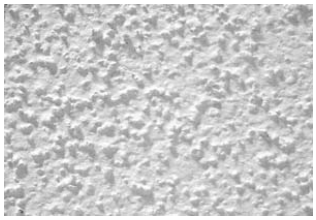
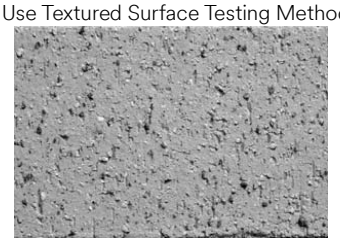
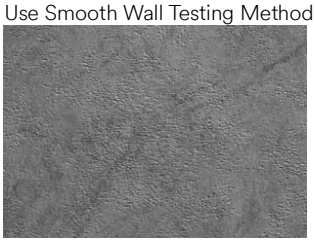
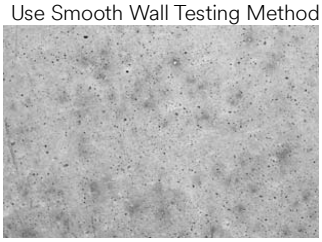
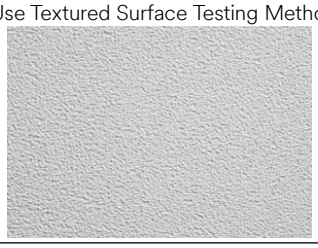
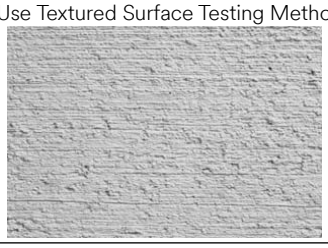
NOTE

In this bulletin, "paint" refers to any type of wall finish.

Photos of Textures

Use the descriptions above and the photos below to determine both the texture and composition of common wall surfaces. These characteristics are important for selecting and using the right film as well as for determining if the wall is suitable for a successful film installation.

Table A. Wall Texture Photos

Painted Wallboard - Smooth Texture Use Smooth Wall Testing Method 	Vinyl Wallcovering - Heavy Unsmooth Texture Use Textured Surface Testing Method 	Concrete - Heavy Unsmooth Texture Use Textured Surface Testing method 
Painted Wallboard - Medium Unsmooth Texture Use Smooth Wall Testing Method 	Vinyl Wallcovering - Heavy Unsmooth Texture Use Textured Surface Testing Method 	CMU/Concrete Block, Painted/Unpainted Medium Unsmooth Texture Use Textured Surface Testing Method 
Painted Wallboard - Heavy Unsmooth Texture Contact Technical Service 	Glazed Tile - Smooth Texture with Mortar Lines Contact Technical Service 	Medium Unsmooth Texture Brick Use Textured Surface Testing Method 
Vinyl Wallcovering - Smooth Texture Use Smooth Wall Testing Method 	Poured Concrete - Smooth Texture Use Smooth Wall Testing Method 	Industrial Stucco - Medium Unsmooth Texture Use Textured Surface Testing Method 
Vinyl Wallcovering - Medium Unsmooth Texture Use Textured Surface Testing Method 	Concrete - Medium Unsmooth Texture Use Textured Surface Testing Method 	

Installation to Smooth Indoor Walls - General Instructions

Tools and Supplies

- Scotch™ Masking Tape, 2 in. wide*
- 3M™ Power Grip Applicator CPA-1*
- 3M™ Plastic Applicator PA-1 Gold Squeegee*
  - Protect one edge with the loop side of 3M™ Hook and Loop Tape* (or another smooth synthetic covering like suede)
- 3M™ Rivet Brush RBA-1*
- 3M™ Rivet Brush RBA-3*
- 3M™ Air Release Tool 391X*
- Cutting tools, such as a 13-point, 9 mm break-off precision utility knife
- Liner cutter
  - This tool has a guide under the blade that slips between the film and the liner so users only cut through the liner. This is sometimes called a wallpaper cutter.
- Industrial heat gun capable of attaining 500°F to 750°F (260°C to 399°C), or equivalent tool

*Available from 3M Commercial Branding and Transportation Division.

About Application Tape

- Application tapes should be used for cut shapes and lettering. Remember that application tapes may have a greater adhesive bond to the film than the film has to the wall surface. Installers should secure the film to the wall surface before removing the application tape. Rework the entire graphic and all edges after removing the application tape.

Plan the Layout

To minimize application problems, test the layout by temporarily positioning the film on the wall using masking tape.

- Certain areas of a film installation are more prone to damage from people or equipment rubbing against the film edges than others. This includes areas around doors, openings such as vents, and outside corners of walls.
- Plan the layout so film edges are in the least vulnerable places possible.
- To reduce the risk of damage and lifting, trim the film 1/8 in. to 1/4 in. (3.2 mm to 6.4 mm) from the edge rather than wrapping vulnerable edges.

NOTE

3M™ Knifeless™ Tape may be applied to the wall before the film to aid in cutting and trimming.

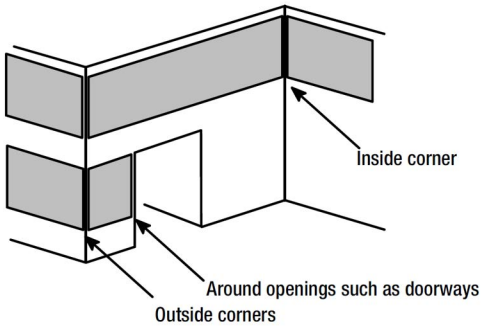


Figure 2. Planning the Layout

- Always plan time in an installation to rework all edges of the film to help ensure good edge adhesion.

General Installation Procedure

1. Follow the 3M™ Enhanced Adhesion Cleaning Method in 3M Instruction Bulletin Application: Substrate Selection and Preparation.
2. Follow the General Installation Procedure in 3M Instruction Bulletin Application: General Installation Techniques.

Installation to Textured Walls - General Instructions

Tools and Supplies

NOTE

Some tools and processes in this bulletin are described and claimed in 3M patents and pending patent applications.

NOTE

Installation of film to textured walls requires the use of high heat, 3M's textured surface applicator tools, and unique installation techniques. To help ensure a successful installation, view the 3M Wall and Textured Surface Videos at 3Mgraphics.com, and/or arrange for a training class, in addition to using this instruction bulletin. Contact a local 3M sales representative for assistance.

- Scotch™ Masking Tape*, 2 in. (5.1 cm) wide
- Industrial heat gun with electronic readout, capable of achieving and sustaining 1000°F (538°C), with a nozzle that fits the 3M™ Two-Handled Textured Surface Applicator TSA-4.
- 3M™ Textured Surface Applicator TSA-1* Large Area Roller
- 3M™ Textured Surface Applicator TSA-2* Grout Line Roller
- 3M™ Textured Surface Applicator TSA-3* Edge Roller
- 3M™ Two-Handled Textured Surface Applicator TSA-4* *Combination Heat Gun Holder and Roller*

NOTE

3M recommends storing all foam tools neatly in a rigid plastic box when not in use. Storing them carelessly with heavy or sharp objects or exposing them to contaminants can damage the foam and reduce the effectiveness of the tools.

- 3M™ Air Release Tool 391X*
- Tweezers
- Cutting tools, such as a 13-point, 9 mm break-off precision utility knife

*Available from 3M Commercial Branding and Transportation Division.

Tips for a Good Installation

NOTE

High heat directed at foam rollers may degrade the foam. Always direct heat toward the film, NOT at the foam roller.

NOTE

High heat may also damage the substrate. Use with caution.

1. Understand how film conforms to a textured wall.
   - **Heat.** High heat warms the film and adhesive to make it more conformable. Insufficient heating of the film during installation may result in a film that looks good immediately following installation, but which lifts days or weeks later.
   - **Speed.** The proper speed allows the film to be warmed sufficiently to relax lifting stresses within the film and conform effectively to the texture while the film is still pliable.
   - **Pressure.** Firm, consistent pressure enables the foam roller to conform the film into the texture. Since the film and adhesive cool very quickly when the heat source is moved away, adhesion occurs quickly.
2. When applying multiple film panels, use a 1/2 in. (12.5 mm) overlap.
3. Assess the wall's grout lines to determine the proper technique for handling them. Refer to "Wall Textures and Compositions" on page 2 for more information and examples.
   - **Less than 1/8 in. (3.2 mm) deep and fairly smooth.** Bridge the grout lines so that at least 1 in. (2.5 cm) of film extends beyond the line in each direction. The heat and pressure of the roller will conform the film into the grout lines

- **Greater than 1/8 in. (3.2 mm) deep and/or heavily textured.** Align the first outside corner on the corner of the brick or tile next to the grout line. After installing the film, trim the film from the grout lines as described in "Mosaic Graphic Technique" on page 9.

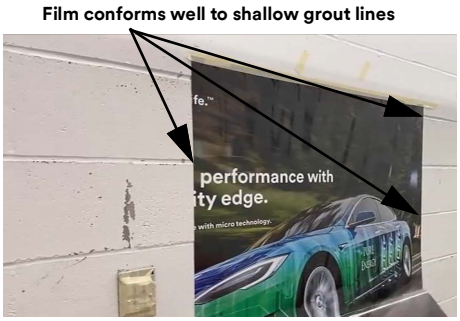


Figure 3. Shallow Grout Lines

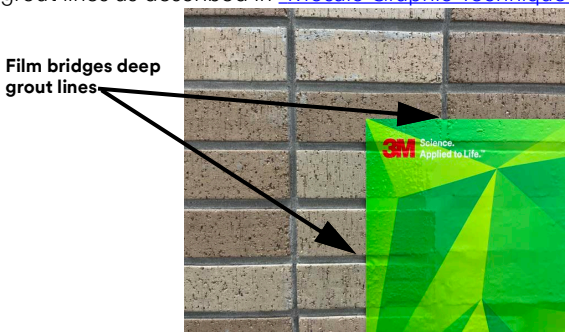


Figure 4. Deep Grout Lines

Using the 3M™ Two-Handled Textured Surface Applicator TSA-4

WARNING

The metal surfaces of the TSA-4 become hot during use. Even after shutting off the heat gun, the metal may burn unprotected skin until the tool cools.

- Read and follow the manufacturer's instructions for the heat source.
- Avoid personal contact with the heat source.
- Always wear heat-resistant gloves and safety glasses when using the TSA-4.
- Do NOT use heat sources near solvent mixtures or residues, or where solvent vapors may be present.

1. Consider this before mounting the heat gun:
   a. Use a heat gun with a 1.53 in. to 1.55 in. (38.9 mm to 39.3 mm) diameter barrel.
   b. The heat gun must heat the film before the roller contacts the film.

NOTE

In the orientation shown in Figure 5, the installer would always lead with the right hand and follow with the left hand. To lead with the left hand, rotate the tool 180 degrees.

2. Position the heat gun in the heat gun holder so only about 1/2 in. (1.3 cm) of the nozzle extends beyond the opening. Tighten the clamping knob snugly. The end of the nozzle should be about 1 in. (2.5 cm) above the film when the tool is in use.

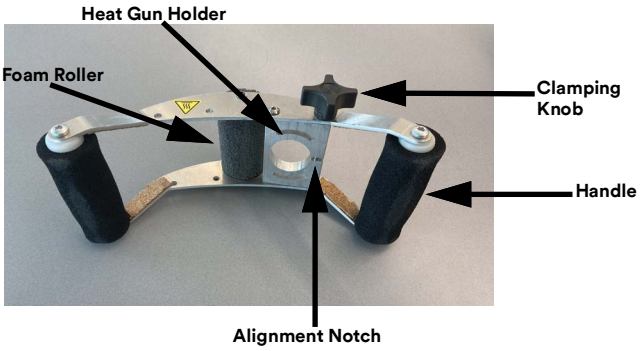


Figure 5. Applicator TSA-4

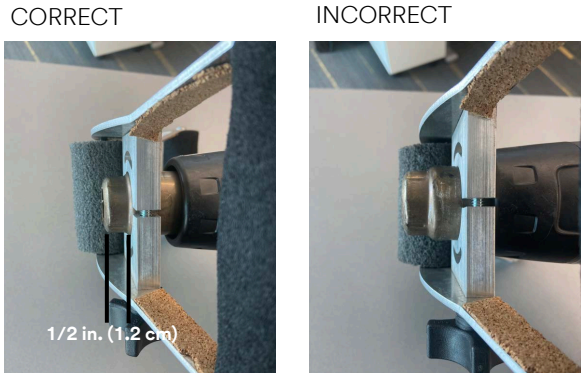


Figure 6. Positioning Heat Gun Nozzle in TSA-4 Tool

3. Start every stroke just off the film in order to properly seal the edges.
4. Overlap every stroke by half the height of the TSA-4's foam roller. Align the notch in the heat gun holder with the bottom of the previous stroke to guide the next stroke.
5. Maintain a consistent temperature of 1000°F (538°C).

6. Use proper TSA-4 tool ergonomics.
   a. Keep the handles parallel to the installation wall so the foam roller maintains uniform pressure at both the top and bottom of the roller.
   b. Keep the gun nozzle at an even distance from the film during the entire installation.
   c. Walk along the length of the film, keeping your body centered in front of the tool to provide even pressure.
   d. Apply enough pressure to conform the film to the substrate.

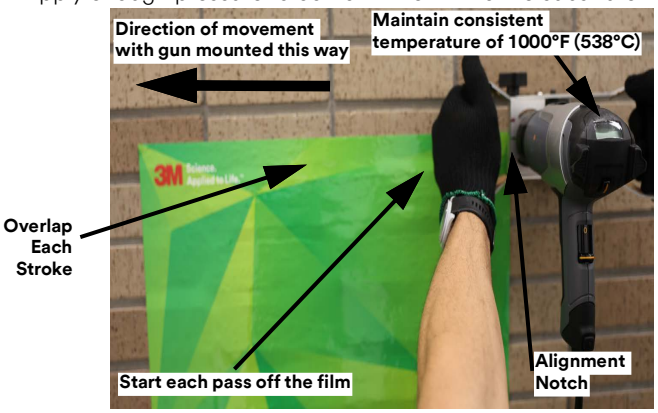


Figure 7. Good Installation Techniques

Figure 8. Lean into the wall to achieve consistent pressure on the TSA-4 tool.

7. Conform the film/overlaminate at the right speed for consistent results.
   a. For 3M™ Scotchcal™ Graphic Film for Textured Surfaces IJ8624 (“IJ8624”) with 3M™ Scotchcal™ Luster Overlaminate 8524 (“8524”), move the heat gun at about 2 in./sec (5.1 cm/sec). Apply consistent pressure and overlap each stroke by 50% over the previous one.
   b. For 3M™ Envision™ Print Wrap Film LX480mC (“LX480mC”) or 3M™ Envision ™ Print Wrap Film SV480mC (“SV480mC”) with 3M™ Envision™ Gloss Wrap Overlaminate 8548G (“8548G”), move the heat gun at about 3 in./sec (7.6 cm/sec). Apply consistent pressure and overlap each stroke by 50% over the previous one.
8. Stop work occasionally to examine the applied film for problems indicating speed, heat, pressure, or overlap adjustments are needed. Working too slowly overheats the film and may burn it. Working too quickly prevents good adhesion and conformability, which may appear as gloss banding. Here are some possible issues and ways to improve installation techniques to avoid them.

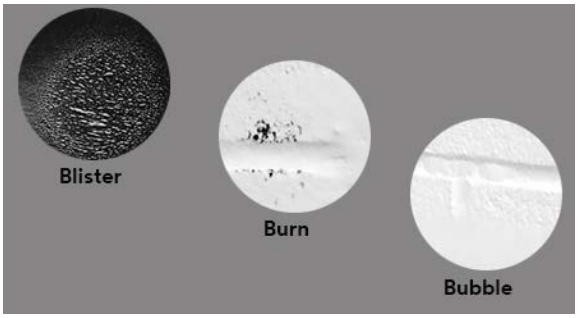


Figure 9. Examples of Installation Problems Related to Speed and/or Pressure

   a. Use one of the two following methods to reduce gloss banding:
      - Increase the application speed to 5 in./sec (12.7 cm/sec). Apply consistent pressure with a 75% overlap (a 25% progression). This process works best on painted cinderblock with grouting less than 1/8 in. (3.2 mm) deep.
      - Use 3M™ Envision™ Matte Wrap Overlaminate 8550M (“8550M”) instead of 8524 or 8548G.

NOTE

The technique described in Step 8a may increase the likelihood of film lifting from channels.

NOTE

Film for textured surfaces is protected by an overlaminate. Heat during installation reduces the overlaminate’s sheen. Observing sheen variations in installed film helps installers troubleshoot their installation technique.

   b. **Blisters or burns.** Do the next pass a little faster.
   c. **Bubbles.** Slow down a little and apply more pressure.

NOTE

Installers should practice on each type of substrate to which they will apply film to learn the proper installation speeds and overlaps. The biggest problem inexperienced installers have is moving too quickly.

Textured Wall Film Installation Procedure

1. Follow the 3M™ Enhanced Adhesion Cleaning Method as described in 3M Instruction Bulletin Application: Substrate Selection and Preparation.
2. Remove the liner. Do NOT allow the film's exposed adhesive to fold back on itself.
3. Align the film to the wall, ensuring the film edges are NOT placed in a grout line. Use two people to align larger pieces of film.
4. Pass your hand lightly over the film to pre-adhere it to the wall. The texture of the wall prevents the film from adhering too securely, so installers will still be able to easily straighten any wrinkles or adjust the alignment.
5. Set the heat gun to 1000°F (538°C) and allow it to heat up.
6. Lightly set the film edges with the TSA-4 tool.

NOTE

In general, sealing three of the four edges is sufficient. Leaving one edge open maintains an important air escape route.

- If the grout lines are shallow—1/8 in. (3.2 mm) or less—the film will conform to these shallow lines.
- If the wall has deep grout line—greater than 1/8 in. (3.2 mm)—installers *can* seal all four edges, if desired. Deep grout lines provide sufficient air escape routes as the film will not conform into the lines.

Figure 10. Use a hand to pre-adhere the film to the wall.

Figure 11. Lightly Setting Three Film Edges

Figure 12. Lightly Setting Four Edges on Deep Grout Line Applications

7. Start the installation at an outside top corner, with the heat gun holder aligned 50% on the film and 50% on the wall. Lead with the heat gun and work straight across the film without stopping until the heat gun has completely passed the other edge of the film. Use these speeds:
   a. For IJ8624 with 8524, move at about 2 in./sec (5.1 cm/sec).
   b. For LX480mC/SV480mC with 8550M, move at about 3 in./sec (7.6 cm/sec).
8. Make the next pass, starting at a place that overlaps the previous pass by about 50%. An easy way to align the overlap is to align the notch in the TSA-4 tool with the bottom of the previous pass.

Figure 13. Starting Position

Figure 14. Align the notch in the TSA-4 tool with the bottom of the previous pass to ensure a 50% pass overlap

9. If there is banding or evidence that the film is not well adhered in some areas, remove the heat gun from the TSA-4 tool. Use the heat gun to heat the film, and conform the film with the TSA-3 tool or V-CAT tool.

NOTE

Direct the heat at the film, NOT at the tool's foam roller.

10. For outdoor installations, 3M recommends applying sealant along the top edge of the film. This can prevent water from being trapped behind the film, which can lead to lifting and mold creation.

Figure 15. Use the TSA-3 tool and heat gun to touch up poorly adhered areas.

Mosaic Graphic Technique

This technique removes film that bridges grout lines. It is highly recommended for grout lines deeper than 1/8 in. (3.2 mm) and/or where mortar is highly textured. Failure to remove bridged film may result in premature installation failure. Although time consuming, this technique creates the striking appearance of an image that is kiln fired onto bricks or tile, or even painted on.

1. Hold a clean, sharp razor against the edge of the block and cut the film as cleanly as possible around each block. Try to leave a very slim margin of film—about 1/16 in. (1.6 mm)—around the blocks.

NOTE

The first cut on a bridged grout line is always the easiest since the film is under tension. Installers may find it helpful to hold the cut side with tweezers or an air release tool to maintain tension on the film as they make the parallel cut.

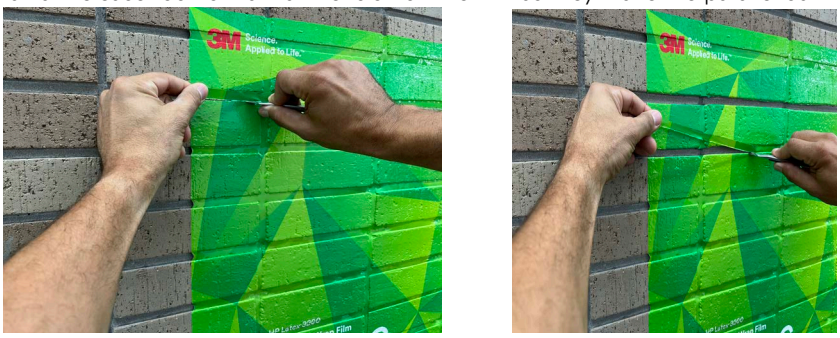


Figure 16. Cutting Film From Grout Lines

2. Heat and roll all edges of each block with the heat gun and the TSA-2 tool to ensure good adhesion. The foam's flexibility conforms the film around the edges. Inspect the edges for good adhesion.

NOTE

Direct the heat at the film, NOT at the foam roller of the tool.

Figure 17. Finishing Edges Around Blocks

NOTE

Attempting to force the film into deep grout lines will result in the film either tearing or popping back out of the grout lines.

Working Around an Obstruction

The best technique for working around wall obstructions, such as an electrical outlet, is to cut the film out around the obstruction.

1. Cover the obstruction with masking tape to prevent film adhering to it.
2. Position the film on the wall and create a tape hinge on one edge.
3. Remove the liner.
4. Drape the film over the obstruction and pre-adhere the edges of the film with a hand.
5. Cut the film away from the obstruction a little at a time, leaving about 1/8 in. (3.2 mm) of film on the obstruction on all four edges.
6. Use the TSA-4 tool to lightly set the edges of the film on three sides.
7. Heat the film around the obstruction and use a PA-1 plastic squeegee to conform the film around its edges.

Figure 18. Cover the obstruction with masking tape.

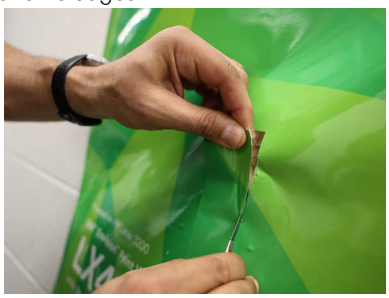


Figure 19. Cut away the film a little bit at a time.

Figure 20. Tuck film around the obstruction.

8. Heat the film again and use the TSA-2 tool to conform 1 in. to 2 in. (2.5 cm to 5.1 cm) of film around the obstruction. See Figure 21.

   NOTE

   Direct the heat at the film, NOT at the foam rollers of the tool.

9. Apply as much film as possible above and below the obstruction, making horizontal passes with the TSA-4 tool.
10. Finish applying film up to and around the obstruction.
    a. Work from the leading edge of the film to the edge of the obstruction.
    b. Seal the film on the back edge of the obstruction.
    c. Apply the remainder of the film working from the obstruction to the trailing edge of the film.
11. Trim away any excess film covering the obstruction as required, or (if possible) tuck the excess film underneath the obstruction.

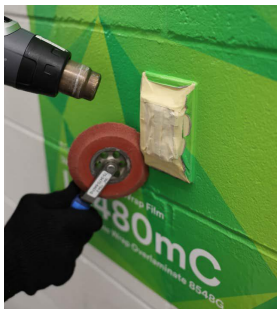


Figure 21. Conforming Film Around an Obstruction

Figure 22. Conforming Film From the Leading Edge to the Obstruction

Figure 23. Locking the Film On the Back Edge of the Obstruction

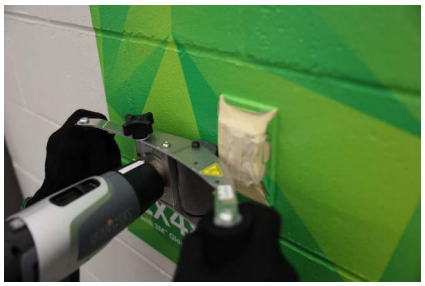


Figure 24. Conforming Film From the Obstruction to the Back Edge

Graphic Maintenance, Repair, Removal: Smooth and Textured

Refer to 3M Instruction Bulletin Maintenance for detailed graphic cleaning and repair guidelines. Refer to 3M Instruction Bulletin Removal for detailed removal guidelines.

Troubleshooting

1. Ensure the walls are in good condition before applying graphics. This reduces installation time while improving graphic appearance and removal characteristics.
2. Review all troubleshooting options before deciding on a course of action.
3. Every wall paint must cure fully according to the paint manufacturer's recommendations. See 3M Instruction Bulletin Application: Substrate Selection and Preparation for details.
4. Follow the 3M Adhesion Tests in 3M Instruction Bulletin Application: Substrate Selection and Preparation for every film you intend to use and on each different wall included in the installation.
5. Every installation wall must be cleaned with the 3M Enhanced Adhesion Cleaning Method as described in 3M Instruction Bulletin Application: Substrate Selection and Preparation before performing a 3M Adhesion Test and before doing the full installation.
6. Report installation issues to the graphics manufacturer.

Table B. Troubleshooting Table

Problem		What to Look For	Recommended Solutions
A. Tool Problems - TEXTURED Walls Only			
1	Foam on the tool is falling apart	The foam was exposed to too much heat.	Do NOT direct the heat from the gun at the foam, as doing so causes it to degrade. Do NOT rub the tool against the hot barrel of the heat gun.
2		The foam tools were improperly stored.	Store foam tools neatly in a rigid plastic box to avoid exposure to heavy or sharp objects, or to contaminants, which can damage the foam and reduce the tools' effectiveness.
3		The tool is worn out.	Replacement foam rollers are available for TSA-1 and TSA-4 tools. Contact 3M Customer Service.
B. Installation Problems - TEXTURED Walls Only			
4	Film does not conform to grout lines	The mortar in grout lines is very rough, loose, and/or flakey. The grout lines have too much texture or too severe a profile.	Refer to "Wall Textures and Compositions" on page 2 for more information on grout lines. Clean with a brush and dust away debris, then follow the 3M Enhanced Adhesion Cleaning Method as described in 3M Instruction Bulletin Application: Substrate Selection and Preparation. Consider using LX480mC/SV480mC, which conforms better over rough mortar. Cut the film away from grout lines for a "Mosaic Graphic Technique" on page 9.
5	Film is not conforming well to texture	The film was not heated enough.	1. Ensure the heat gun is about 1 in. (2.5 cm) above the film. 2. Increase the heat. 3. Slow down a little. 4. Apply a little more pressure to the tool. **NOTE:** Most textured substrates do NOT hold heat well, and cause the film to cool more quickly than installers might expect.
6		The wall is too cold.	Refer to the film's product bulletin for the installation temperature range.
7	Film seems too stretchy; adhesive is delaminating from the film	The wall is too hot.	The surface temperature of the wall should be less than 100°F (38°C) during the installation. Heat from the wall and heat gun can cause the film to become stretchy and the adhesive could delaminate from the film layer.
8	Film melts or blisters	The heat was concentrated too long in one area.	Move the heat gun and tool a little more quickly. Recommended application speeds are: • **IJ8624 with 8524:** 2 in./sec (5.1 cm/sec) • **LX480mC/SV480mC with 8548G:** 3 in./sec (7.6 cm/sec)

Problem		What to Look For	Recommended Solutions
9	Film pops up from grout lines	The grout lines are too deep.	Wall tools typically apply only light pressure to grout lines deeper than 1/8 in. (3.2 mm). Work out any air bubbles, then try re-rolling the grout lines by applying heat and conforming the film with the TSA-2 tool. A contour gauge can be useful for visualizing grout line depth. Finish the film with the "Mosaic Graphic Technique" on page 9.
10		The grout lines are too sharp.	IJ8624 does NOT conform well to square-cut (raked) or undercut grout lines as the film requires more stretching and the tools do not reach the corners. LX480mC/SV480mC may adhere more successfully to rough mortar texture.
11		The film was not heated properly and was not worked well into the grout lines.	Typical rate of installation with a heat gun set to 1000°F (538°C): • **IJ8624 with 8524:** less than 50 ft^2/hour (4.6 sq m/hour) • **LX480mC/SV480mC with 8548G:** less than 75 ft^2/hour (7 sq m/hour)
12		The film does not conform to the texture.	Perform the **3M Adhesion Test** as described in 3M Instruction Bulletin Application: Substrate Selection and Preparation before committing to the entire installation. Follow the 3M™ Enhanced Adhesion Cleaning Method in the same bulletin. As a last resort, apply 3M™ Primer 94 to the entire installation area before applying the film.
13	Film pops up from grout lines; leaks adhesive	The printed film was not adequately dried prior to applying an overlaminate.	3M always recommends allowing solvent inkjet printed film to dry for 24 hours before applying an overlaminate.
14	Film lifts over caulked lines	The film will not stick to silicone caulk.	Using an acrylic caulk (even over existing caulk) may improve adhesion. Finish the film with the "Mosaic Graphic Technique" on page 9.
15	Bubbling and poor adhesion	The film was applied to a damp substrate.	Exposure to rain, high humidity, or irrigation systems may make textured walls too damp for some installations. Do NOT apply film to damp substrates or substrates that cannot be adequately dried. Heating the substrate to dry it may help.
16	Large bubbles appear behind the film	The film was not fully adhered during the tool's first pass.	Use enough pressure to press and conform the film into the lowest areas of the texture on the first pass with heat and the TSA-4 tool. Bridged areas (mortar lines) tend to lift more than other areas.
17		The grout line is excessively deep.	Wall tools typically apply only light pressure to grout lines deeper than 1/8 in. (3.2 mm). Work out any air bubbles, then try re-rolling the grout lines by applying heat and conforming the film with the TSA-2 tool. A contour gauge can be useful for visualizing grout line depth. Finish the film with the "Mosaic Graphic Technique" on page 9.
18		The channels through which air escapes were sealed before the film was fully applied.	If air becomes trapped because all air release channels are closed off, use standard air release techniques, then apply heat and re-roll the film using a TSA tool.
19		The film was applied to flat, glazed tile.	For the best results, use Film LX480mC/SV480mC with Overlaminate 8548G. Use a flat squeegee and conventional vehicle installation techniques. Then re-roll the grout lines using the TSA-1 or TSA-3 tool. Do NOT overheat the substrate. Doing so may crack the tiles. For very smooth tiles with little surface texture or contours, consider using 3M™ Controltac™ Graphic Film w/Comply™ Adhesive v3 IJ180Cv3-10 and finish the grout lines with a TSA tool and light heat.
20	Difficulty wrapping textured columns	Wrong product	Use LX480mC/SV480mC with 8548G for the best results. This graphic construction is generally flexible enough to wrap on a textured column.
21		The film is not level/properly aligned.	Use a laser level to ensure a level graphic.
22		Too much adhesive was exposed at one time.	Wrap the columns by working around the circumference, and pulling away only a foot or two of the liner at a time.

Problem		What to Look For	Recommended Solutions
E. Post-Installation Problems - Textured Walls Only			
23	Visual bands on applied graphic	The installer did not overlap every pass of the tool.	Overlap each pass of the tool by at least 50%, using the proper heat, pressure, and installation speed. See Figure 14 on page 8 for a tip on overlaps. Typical rate of installation: • **IJ8624 with 8524:** 2 in./sec (5.1 cm/sec); about 50 ft^2/hour (4.6 sq m/hour) or 20-30 minutes for a 4 ft by 8 ft (1.2 m by 2.4 m) panel. • **LX480mC/SV480mC with 8548G:** 3 in./sec; about 75 ft^2/hour (7 sq m/hr) or about 15 minutes for a 4 ft by 8 ft (1.2 m by 2.4 m) panel. Properly applied, the finished appearance of the graphic will be more luster than gloss.
24	Film is popping off the substrate	The film was not heated enough.	See "Installation Problems - TEXTURED Walls Only" in this table.
25		The film was not heated evenly.	Move at a consistent speed with even pressure, overlapping every pass.
26		Not enough heat was used.	Use a digital heat gun with an internal temperature of about 1000°F (538°C). Hold the heat gun 1 in. (2.5 cm) from the film being heated.
27		The environment was too hot.	Install the film during the coolest part of the day. Check the substrate temperature with an IR gun.
F. Post-Installation Problems - All Walls			
28	A large portion of film lifts or falls off prematurely	The moisture behind the wallboard causes wallboard paper to release.	Avoid installations on walls backing up to cooling systems, water pipes, or overhead windows (including boarded up windows) that could create condensation or drip water onto the graphic.
29	The wall or its paint or wallcovering is damaged during graphic removal	The wall is poured concrete.	The outer 0.5 mm to 1 mm of a poured concrete surface is often loosely bonded together, even though it doesn't appear that way. Even if the paint covering the wall is well cured and bonded, the force used in pulling off an adhesive product may fracture the concrete layer, pulling it and the paint off. Always perform 3M Adhesion Tests in an inconspicuous area to determine the likelihood of damage to a wall, with the understanding that this is not a definitive test.
30	Film is popping off the substrate	The texture is too severe.	It is difficult to force film into cavities of deeply recessed texture or sharp bumps. Experiment with increasing the heat and adjusting the installation pressure, and try a variety of tools such as TSA-1, TSA-2, TSA-3, and CMP-1. 3M textured wall films are most successful on moderately textured walls.

Technical Service

Contact local 3M sales representatives or application engineers for assistance reviewing film adhesion test results or for other questions regarding wall installations.

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.

Air Quality Regulations

Country, state, or regional volatile organic compound (VOC) regulations may prohibit the use of certain chemicals with VOCs in graphic arts coatings and printing operations. Check with local environmental authorities to determine whether use of this product may be restricted or prohibited.

⚠ **CAUTION**

Ergonomics

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 or removing 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.

Ventilation

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.

Warranty Information

- 3M does NOT provide extended warranty coverage (3M™ MCS™ Warranty or 3M™ Performance Guarantee) for wall applications.
- 3M does NOT warrant easy or clean removal of any film, even film described as removable or changeable, from indoor or outdoor walls. Removal may damage the substrate by removing paint, changing the paint's gloss, or pulling paper off of wallboard. The bond of a paint to the wall is often less than the bond of the film to the paint. Proper removal techniques may help minimize damage.
- The 3M Adhesion Tests may not detect problems with pre-existing variations in the substrate, poor paint-to-substrate bonds, poor bonds between multiple layers of paint, or insufficiently cured paint.
- Film applied to contaminated surfaces, or surfaces exhibiting visible signs of peeling, lifting, bubbling, or dampness are likely to fail.
- Under-cured paint may continue to outgas and cause bubbles, even in film that appears to be well applied immediately after application.

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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Worksheet for Walls

NOTE

The results of the 3M Adhesion Tests in 3M Instruction Bulletin Application: Substrate Selection and Preparation will help determine which film is most suitable for a job. Some jobs may require the use of more than one film, depending on the adhesion that can be achieved on each different wall.

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Installation Site Information
Business Name
Address
City/State/Zip
Customer Information
Contact Name
Business Name
Address
City/State/Zip
Area Code/Phone #
Graphics Manufacturer
Business
Area Code/Phone #

Adhesion Test Results		**Finished Graphics To Be Installed**		
Test Strip Film Number	Adhesion Value	Graphic Description	Graphic Size (Sq ft/Sq m)	Location of Wall

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Measured Reference Guide