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Product Information Bulletin

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This information is for all Newmar motorized and towable units with slideouts.

Product Information

Please review the pictures and attached guides lines when using UNI-GRIPS 3M tape for lamination purposes.

- **The recommended temperature range for application is 60° - 110° F.**

Application showing slide out seal exposing tape before adhesion. Prep adhesion area by cleaning contact surface with isopropyl alcohol	Peel the tape back exposing the adhesion surface.	Once the tape is removed, apply constant pressure adhering part to the bonding surface.
		

If you have any questions regarding this P.I.B., please contact a Warranty Service Representative at Newmar Corporation.

Lamination of Tape to Part

Tape Application

Application Guidelines for 3M™ Acrylic Foam Tape and 3M™ Acrylic *Plus* Tape **March 2005**

General Description

Proper tape lamination to an automotive trim component is done by getting 100% contact of the adhesive surface to the part while minimizing any unwanted force, such as stretch, imparted to the tape. This is ideally achieved using roller pressure from one end of the tape to the other as the tape is being applied.

Recommendations

PRESSURE

Pressure is needed to provide intimate contact between the tape and the bonding surface. 3M recommends 15 lbs of roller pressure per 1.27 cm (0.5 in) of tape width. This generally results in 40-45 psi of pressure at the tape surface.

Alternatively, immediate compression during lamination can be used to gauge adequate pressurization. Target to compress the tape one-third to one-half its starting thickness during lamination.

STRETCH

Forces that create stretch during lamination should be minimized. Excessive stretch results in the liner pulling back from the ends of the tape or liner pop-off. Several processing parameters affect tape stretch:

Pressure

Excessive pressure can induce stretch in the tape. Noticeably more pressure than that required to achieve 100% tape contact should be avoided.

Tension

Minimizing tension along the tape path will minimize stretch in the laminated tape. Areas to keep in mind include: limiting the number of idler rollers, minimizing idler drag, selecting materials that provide good release from 3M adhesives, and maintaining the proper tension on the unwind hub.

Speed

Constant speed serves to minimize tension and stretch. Rapid acceleration can increase stretch, and high speeds may adversely affect start/stop positions.

Laminating Roller Diameter

3M recommends using a roller 5 cm (2 in) or larger in diameter. The theoretical stretch caused by the roller is determined by the following formula: (2 x Tape/Liner Thickness / Roller Diameter) x 100% = % Stretch. Based on this, increasing roller diameter reduces the stretch.

TEMPERATURE

The recommended temperature range for applying 3M™ Acrylic Foam Tapes and 3M™ Acrylic *Plus* Tapes is 16-43°C (60 - 110°F.)

Troubleshooting

PRESSURE

Inadequate pressure will lead to reduced contact, or wet-out, to the bonding surface. A *Wet-Out Test* can be run to determine the level of contact and assist in troubleshooting.

Excessive pressure can induce stretch in the tape or cause the tape to take a compression set (the tape does not recover to its original thickness).

Alternatives to roller pressure exist, such as platen-type pressurization where the entire tape area would receive the pressurization force at the same time. This is more often used in pressurizing small sections of tape. While this can be successful, it increases the potential for air entrapment under the tape. This occurs when the perimeter of the tape makes contact before the center and eliminating a path for air to escape. If there are concerns, a wet-out test can be used to evaluate a given tape lamination process.

STRETCH

As stated above, excessive stretch in the tape can cause liner to pull back or pop off. The above outline of process parameters indicates methods of reducing stretch.

In some cases, typically extrusions, automotive components may undergo some shrinkage. If this occurs after tape is applied, liner can ripple and buckle as the tape does not shrink along with the part. This can be overcome by intentionally stretching the tape during application. "Stretch lamination" should be done such that the percent stretch applied to the tape matches the percent shrink expected in the part. Stretch of the tape in these cases should not exceed 4%.

TEMPERATURE

Temperatures outside the recommended range, 16-43°C (60 - 110°F), have the potential of causing issues with tape application. Lower temperatures cause the foam core and adhesive to become stiffer and less compliant, making full contact with the surface more difficult. Higher temperatures soften both the foam and adhesive. While this makes pressurization easier, it may also allow the tape to stretch more.

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Application Guidelines for Tape-Attached Exterior Trim

September 2004

Supersedes technical bulletin dated November 2001

The Six-Sigma process was used to identify the critical components for tape-attached exterior trim. This document is intended to identify best practices and a wider process window when best practices cannot be achieved. 3M intends this document to serve as a general guideline for creating an OEM and a Tier 1 supplier processing standard.

Cleaning Systems

The vehicle surface and installation area where the part is to be applied should be clean. Lubricants, skin oil, airborne dust, etc., can contaminate the body or the trim component and reduce the adhesion performance of the tape to the vehicle.

To increase the robustness of the process, the vehicle surface should be cleaned with Scotch-Brite® High-Performance Cleaning Cloths or a 50/50 mixture of isopropyl alcohol and water with a non-abrasive cloth. The cleaning should remove all contaminations and leave no residue. The best practice is to clean with an automated Scotch-Brite cloth (dry system). Scotch-Brite cloths should be indexed after every three to seven vehicles, or when visually soiled and do not require the use of solvents. The frequency of indexing will depend on the amount of contamination and the size of the vehicle surface cleaned. An acceptable alternate is a solvent wipe with a non-abrasive cloth. The solvent wipe cloth should be indexed after every vehicle and poses environmental and time-to-dry concerns. Both of these systems can be performed manually. Clean the vehicle surface no more than 20 minutes prior to trim component installation.

If cleaning and pressurization equipment cannot be hooked into the electronic factory feedback system, each piece of equipment should have an alarm to notify operators that the equipment is not operational or the solvent dispenser has run dry or is empty (if using the solvent system).

If a facility cleans by hand, the operators should wipe the entire portion of the vehicle to which trim is to be applied.

Temperature

The recommended temperature range for both the vehicle surface and the part during application is 15.6° - 43.3° C (60° - 110° F). The component supplier should be consulted regarding optimum installation temperature. In the event a manufacturer needs to operate outside these limits, further testing is required. See "Wet Out" section for additional details.

Liner Removal

The liner should not be removed until the part is going to be applied. Care should be taken to not touch or contaminate the tape adhesive. Some liners will have a pull-tab for removal. For those liners without a pull-tab (or if the pull-tab breaks), an operator can remove the liner with a hard wire brush or similar tool.

Trim Component

Ensure optimum trim component temperature. The component temperature is a more critical process variable than body surface temperature. Elevated component temperatures widen the process window in these ways:

- A heated trim component is typically more pliable and therefore conforms easier to the vehicle body. This is especially true of extruded PVC moldings. The component supplier should be consulted regarding the optimum installation temperature of the component.
- Heat is not required for 3M pressure sensitive adhesives (psa)
- The recommended adhesive surface temperature range for 3M automotive adhesives is 15.6° - 43.3° C (60° - 110° F).

When considering whether or not component heaters are required, be sure to take these variables into account:

- Ambient temperature of the component storage area.
- Expected ambient plant temperature.
- Component dwell time at ambient temperature (J.I.T., etc.).
- Location in the assembly process.
- Component geometry and fit to the sheet metal.
- Component material and its properties (flex modulus, CLTE, etc.).
- Expected component and sheet metal tolerance and resulting match.

Place the trim component to the vehicle. This can be accomplished automatically with fixtures, or manually. Proper alignment helps to ensure the proper location of the trim component. **Proper location is absolutely critical** because the contour of the molding is designed to match a specific area and contour of the sheet metal. Manual installation increases the chance for misplacement.

Remove the liner from the tape. Do this immediately prior to applying the trim component to the vehicle, being careful to keep contaminants off the adhesive. Contaminated moldings should not be used.

Apply the trim component in a fashion that will prevent the entrapment of air between the tape and the body of the vehicle.

Part Application

The part must be located on the vehicle according to the design tolerances. If the part is not properly located, it could lead to poor wet out and/or higher residual stresses. The part should be applied to the vehicle such that the part is not distorted beyond its design tolerance (either with a fixture or by hand). Examples of distortion are twisting of the part, improper storage or misused fixtures.

Roller Angle and Location

The best practice is for the contact point of the roller to be directly over the tape land area and perpendicular to the tape surface. Trial tests should be run in the plant at the beginning of a launch to ensure that the rollers are at the proper location and angle, given part geometry, to achieve wet out. Once the correct angle and roller location (relative to vehicle) are determined, the dimensions should be documented for repeatability and future reference. See "Wet-Out" section for verification testing. It is important to note that as the roller angle deviates from perpendicular, the contact point also changes. Thus, an adjustment is likely necessary to ensure that the contact point is over the tape land area. Although acceptable wet out can be achieved at different angles, this should be verified through in-plant wet out testing.

Roller Pressurizing Force

The recommended load should be equal to 15 pounds force per half-inch of tape width at the tape surface.

The actual pressure required to achieve wet out will be dependent upon both the part section modulus and geometric mismatch of the part to sheet metal. If proper wet out is not achieved at 15 pounds of force, continue to increase in 5 pound increments. In extreme cases, increasing pressure will not achieve the desired result. If the pressurization force is too large there can be deformation of the part and/or sheet metal.

It is critical to pressurize 100% of the tape land area (regardless if the part is mechanically or hand applied). Verification should be made with a wet out test.

If applicable, for large components (with more than two tape strips), it is better to pressurize the middle tape land areas first and then the perimeter tape land areas. Application of the trim component in this manner will reduce residual stress on the part.

Wet Out

The recommended minimum wet out is 80%.

Wet out testing confirms sufficient contact of tape to vehicle. Key elements to successful wet out are part match to vehicle, roller angle, location and pressure. Applications demonstrating less than 80% wet out are questionable and are candidates for further process and/or design improvements. Any single area without wet out shall represent no more than 15% of the total tape surface area. For wet out procedures see the 3M Automotive Technical Update, dated January 2004, "Plant Wet Out Test Procedures for PSA-Attached Moldings." Examples of wet out test results are included in this bulletin.

If a part is not adhering well to the vehicle, a possible solution would be to heat the part. Heating above ambient is not required for 3M pressure sensitive adhesives, but in some instances heat should be applied to the trim component. A heated trim component is typically more pliable and will conform easier to the vehicle surface. The component supplier should be consulted regarding optimum installation temperature.

Paint Systems

Adhesive tapes' ability to adhere to paint systems varies by manufacturer and formulation. Adhesion testing should be performed with all new clear coat systems to determine which tape products are needed for acceptable bonding. When paint systems change it is important that adhesion testing/part validation testing be conducted to ensure that the necessary adhesion can be achieved. 3M technical service experts should be consulted when new paint systems are encountered.

Plant Wet Out Test Procedure for PSA-Attached Moldings

1. Apply a very thin coating of water-based paint to the vehicle body where the moldings will be attached using a closed foam paintbrush. Recommended water-based paints include: Crayola® kids paint (available at Walmart) and Rich Art™ Clean Colors (available at Michaels Arts and Crafts Store). Note: If the application uses PT, ST, or NT tapes, adding UV dye (1 packet per 8 oz. bottle) to the water-based paint is recommended to enhance the visual effect under a UV light. Packets of UV dye can be obtained from PPG Aerospace / PRC Desoto @ 317-290-1600.

Plant Wet Out Test
cont.

2. Allow the paint to become dry to the touch. To verify dryness, check for paint transfer to your fingertip. Do not touch molding interface area when checking for dryness. The paint is ready when none transfers to your finger. Depending on the ambient temperature and humidity, drying should be complete in about three to five minutes at room temperature, quicker if body heaters, fans, etc. are used in process. It is important to wait for the paint to be sufficiently dry before beginning the test. Paint that is too wet or too dry will not accurately determine wet out. Some guidelines for identifying paint that is too dry are found below:

- "Too-dry" Time Guide: Do not conduct a test when the paint has been on the vehicle for more than 20 minutes.
- "Too-dry" Visual Guide: Do not conduct a test when the paint is over-dried, or when the paint has a "flaked" appearance on the adhesive surface of the tape after testing.

3. Ensure that any automated surface cleaning operations are disabled for the test vehicle(s) if the test paint needs to be applied before this stage on the production line to allow for proper drying.

4. Remove the tape liner and process the trim molding using the normal production process.

5. Remove the part, being careful not to touch the tape. The paint will transfer to areas of the tape that are being adequately pressurized, yielding a "footprint" of areas properly wet out. You may wish to cover the adhesive surface with clear packaging tape to avoid damaging the wet out imprint.

6. Look at the tape surface and determine which areas have paint transfer. To determine wet out, a grid made up of 1mm x 1mm squares may be used to measure percent tape wet out to the body. (Examples of Wet Out Test Results can be found later in this bulletin.)

7. Upon completion of the test, remove the water-based paint from the vehicle using water and clean cloths. Using solvents other than water makes cleaning more difficult.

8. Prepare the bonding surface of the body for the production part by cleaning with a 50/50 alcohol/water wash or Scotch-Brite® High Performance Cleaning Cloths.

Acceptance Guidelines

- Applications demonstrating less than 80% wet-out are questionable and are candidates for further process and/or design improvements.
- Any single area without paint transfer shall not represent more than 15% of the total tape surface area.

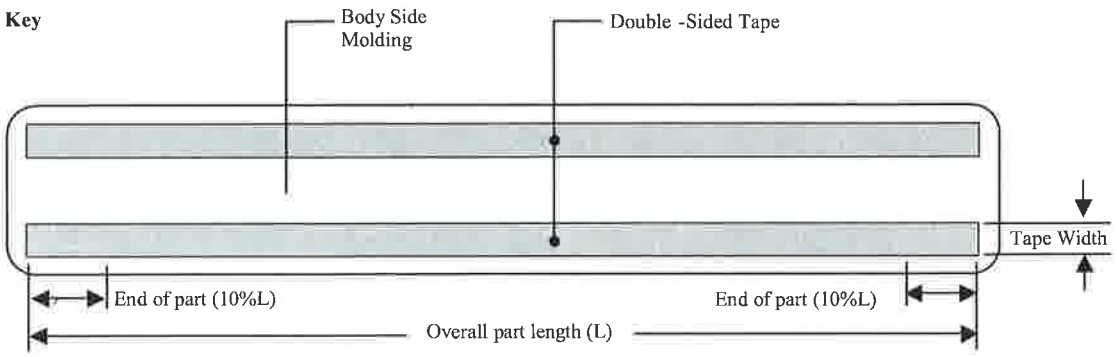
Removal and Reapplication of Tape-Attached Component

3M does not recommend relocating a component once it has contacted the surface. If a trim component must be relocated, be sure to follow these guidelines:

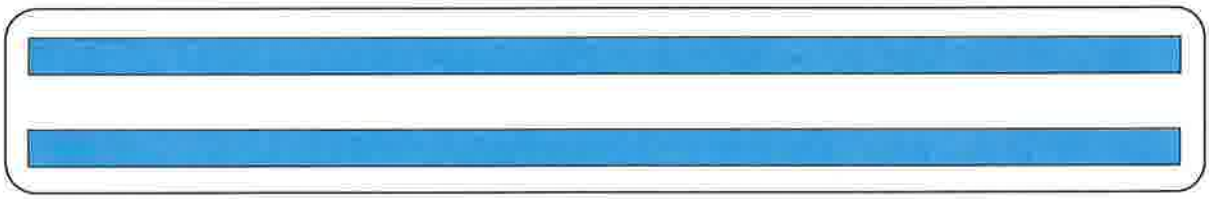
- The molding is removed prior to final roll down (pressurization) so adhesive wet out is at a minimum.
- The molding is removed immediately after application to minimize adhesion.
- The adhesive on the molding is not touched or contaminated in any way after it is removed.
- The molding is exposed to final roll down after reapplication.

Examples of Wet Out Test Results

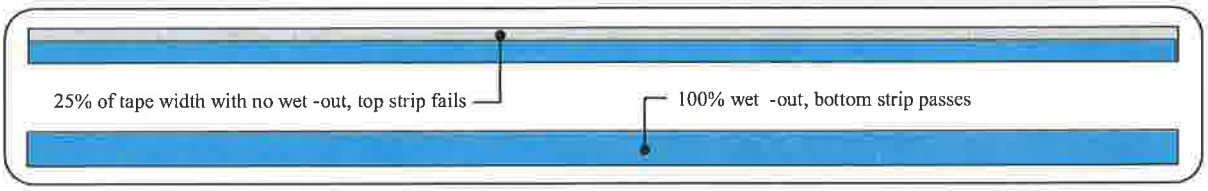
Key



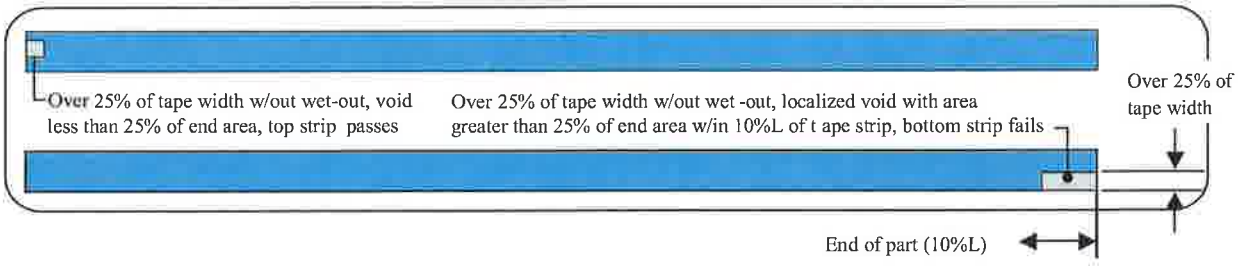
Example A 100% Wet out on both strips, No Voids – Pass Test



Example B Fails Wet out on Top Strip, Unacceptable Tape Perimeter Void – Fail Test

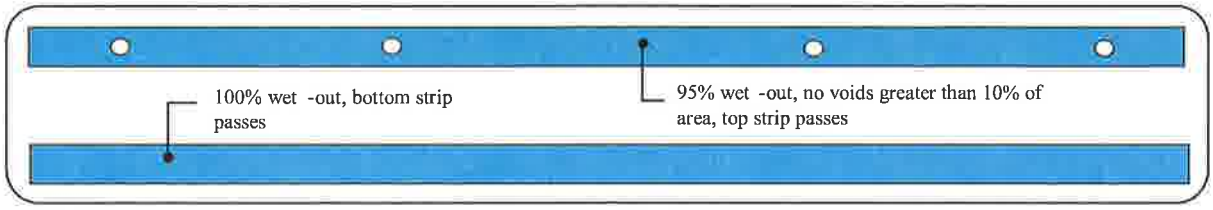


Example C Passes Wet Out, Unacceptable Void on Bottom Tape Strip – Fail Test

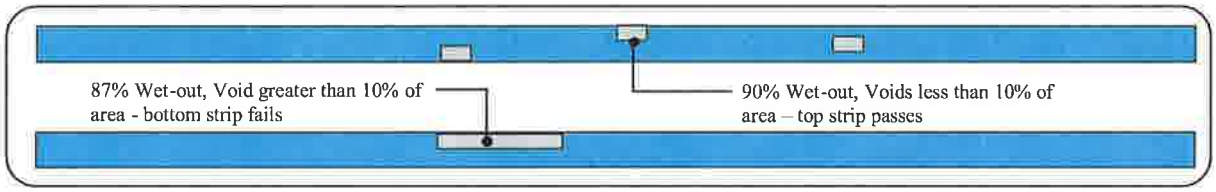


Examples of Wet Out Test Results

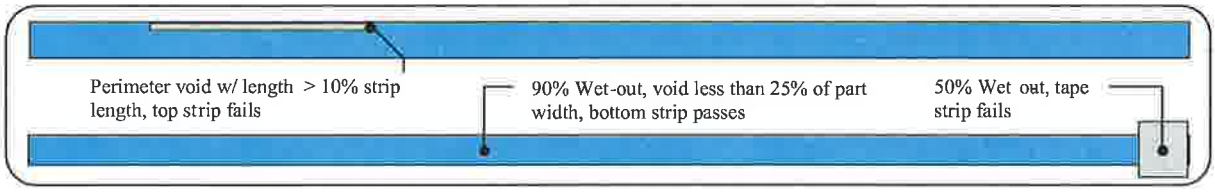
Example D Passes Wet out, No Localized Voids – Pass Test



Example E Passes Wet out, Localized Void on Bottom Strip – Fail Test



Example F Fails Wet Out Test, Unacceptable Localized Void – Fail Test



The user is responsible for determining whether these 3M products are suitable for use with the substrate and in the particular application conditions intended. Certain substrates may be difficult to bond to and, in some cases, may require the use of an adhesion promoter to ensure adhesion. Please contact your area 3M Automotive Sales Representative for assistance with any application questions or needs.

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