



# Stamark™ Tapes Pavement Surface Preparation and Application Techniques

**Information Folder 5.7**

**November 2009**

Replaces IF 5.7 dated March 2009

<b>Introduction</b> .....	<b>2</b>
<b>Product Application Requirements</b> .....	<b>3</b>
<b>Adhesive Series of Stamark Tapes</b> .....	<b>3</b>
<b>Inlay Application of Long Lines</b> .....	<b>4</b>
<b>Inlay Application of Transverse Markings</b> .....	<b>6</b>
<b>Overlay Application of Long Lines</b> .....	<b>8</b>
<b>Overlay Application of Transverse Markings</b> .....	<b>11</b>
<b>Storage</b> .....	<b>15</b>
<b>Removal</b> .....	<b>15</b>
<b>Health and Safety</b> .....	<b>15</b>
<b>Caution</b> .....	<b>15</b>
<b>Appendix A. Pavement Surface Types</b> .....	<b>16</b>
<b>Appendix B. Surface Preparation Adhesives</b> .....	<b>17</b>
<b>Appendix C. Road Type Surface Preparation Adhesive Application Recommendations</b> .....	<b>18</b>
<b>Literature Reference</b> .....	<b>18</b>

## Introduction

This information folder contains pavement surface preparation requirements and application procedures for 3M™ Stamark™ Pavement Marking Tapes. It is important that users be completely knowledgeable of all application requirements and procedures prior to product application. Instructions contained in this folder must be followed for material replacement provisions to be considered valid. Material replacement provisions are described in the appropriate product bulletins.

It is the responsibility of the installer to contact the 3M sales representative or 3M technical service representative whenever there is a question regarding application procedures or conditions.

## 3M™ Stamark™ Tape General Product Summary

Stamark tapes are durable, reflective pavement marking tapes used to mark asphalt and concrete surfaces. Stamark high performance tape is available in white or yellow, standard widths and roll sizes, and A series (unlined), L series (lined) or N series (no liner and no adhesive). It is also available in legend and symbol patterns. Below is a summary of each series of Stamark tape along with recommendations for appropriate uses.\*

### **3M™ Stamark™ High Performance Wet Reflective Tape Series 380WR ES, 380WR-5ES, 380AW, and 380AW-5**

Stamark high performance wet reflective tape is a durable pavement marking tape, highly retroreflective under both wet and dry conditions. Stamark Series 380WR ES and 380AW tape utilizes specially designed optics to provide wet and dry performance. Stamark Series 380AW tape can be used as an inlay marking on new asphalt or as an overlay marking on most asphalt and concrete pavement surfaces in good condition. Series 380WR-5 ES and 380AW-5 consists of standard white pavement marking tape with a 1-1/2 inch wide black edge to provide contrast on light colored asphalt or portland cement concrete surfaces.

### **3M™ Stamark™ High Performance Tape Series 390, 390-5, 380IES and 380I-5 ES**

Stamark high performance tape is a durable, conformable pavement marking providing a high degree of retroreflectivity and durability. This pavement marking tape is manufactured with a patterned surface that presents a near vertical profile to the motorist to maximize retroreflectance and a pliant polymer conformance layer for long term durability. Recommended for a wide variety of uses including long line, gore areas, and intersections (low to medium shear, light truck traffic only) for inlay, grooved and overlay applications. Series 390-5 and 380I-5 ES consists of standard white pavement marking tape with a 1-1/2 inch wide black edge to provide contrast on light colored asphalt or portland cement concrete surfaces.

### **3M™ Stamark™ Pavement Marking Tape Series 270 ES**

Stamark pavement marking tape is manufactured with a polymer conformance layer for durability and a patterned surface for reflectivity. Recommended for a wide variety of uses including intersection and longitudinal markings.

\* See Information Folder 3.2 for information on 3M™ Stamark™ Removable Pavement Marking Tapes.

### **3M™ Stamark™ Pavement Marking Tape Series 310**

Stamark pavement marking tape combines 3M's technology in beads, topcoats and adhesives which results in a pavement marking solution with good durability, retroreflectivity and appearance. Recommended for lane and edge lines on roads with medium to low traffic volumes, and is available in symbols and legends.

## Overlay Product Application Requirements

The following general requirements apply to all Stamark tape applications:

- Temperatures  
Air and surface Temperature: Minimum 40°F (4°C) and rising.  
Overnight Air Temperature: Minimum 40°F (4°C) the night before tape application is recommended. If the temperature falls below 40° F, inspect the pavement surface for visible signs of moisture (dew, frost, etc.).
- Overlay applications must be completed within the seasonal start and end dates for a particular region as indicated in the 3M Climate Guide for 3M™ Stamark™ Pavement Marking Tapes.

3M Climate Guide Season	Surface Preparation Adhesive P-50 (or E-44T) Required?
<i>Within</i> Seasonal Start and End Dates	<i>IS NOT</i> Required
<i>Outside</i> Seasonal Start and End Dates	<i>IS</i> Required

(Note: Regions not covered in the Climate Guide must follow minimum temperature requirements.)

- **The pavement surface must be clean and dry. No rainfall within 24 hours prior to application. Other visible signs of moisture (dew or frost) cannot be present.**
- Butt splices must be used; do not overlap tape ends.
- Traffic must be kept off of pavement surfaces coated with a surface preparation adhesive prior to tape application.

## Adhesive Series of Stamark Tapes

**“A” Series:** Tapes with pressure sensitive adhesive.

“A” Series tapes are shipped on a roll with a release agent top coating on the pavement marking surface. The adhesive on the back of the tape is ready for placement on the road surface once the tape is peeled from the roll.

**“L” Series:** Tapes with liner and pressure sensitive adhesive.

“L” Series tapes are available in both long line pavement markings as well as all symbols and legends. “L” Series tapes are shipped with a liner on the adhesive backing of the tape to allow for ease of handling prior to placement on the road surface. The liner is removed just before placement on the pavement.

**“N” Series:** Tapes with no liner and no pressure sensitive adhesive.

“N” Series tapes are manufactured with no adhesive backing on the tape. Application of “N” series tapes must be made using 3M™ Stamark™ Contact Cement E-44T with a three-coat system, including one coat of E-44T on the tape back surface and two coats on the pavement.

*(See Appendix B for more information.)*

**A 3M Traffic Safety Systems Division technical service representative can be contacted at 1-800-553-1380 in the U.S. or at 1-800-265-1840 in Canada; when prompted, select technical service and then select pavement marking products.**

## Product Application

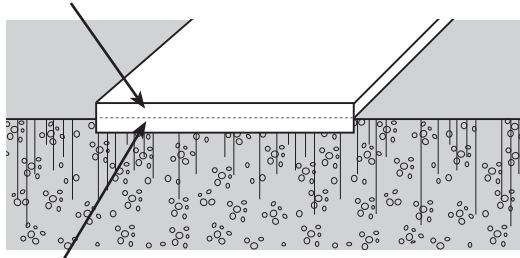
3M™ Stamark™ tapes can be applied by an inlay application (embedding pavement marking tape into fresh asphalt) or by an overlay application (applying tape on existing surface). The tapes can also be overlaid on a grooved surface. Refer to IF 5.18 for more information about a grooved application

## Inlay Application of Long Lines

*Including edge, lane and channelizing lines*

Stamark tapes with pressure sensitive adhesive (A Series) can be applied on fresh asphalt before the finishing roller passes over the surface. Inlaying is the process of embedding pavement marking tape into the road surface. This is done by rolling over the applied tape with a steel-drum finishing roller while the asphalt is still warm. (See Figure 1.)

Tape above road surface (Approximately 40-50%)



Partially Embedded Tape (Approximately 50-60%)

Cross Section of the Road

Figure 1.

### PROCEDURE

#### 1. Pave a lane.

Lanes should be paved so that the tape will not be placed on the asphalt seams between lanes. Generally, the width of the first lane should be approximately 12 inches (30.5 cm) short of center (for example, a 12-foot [3.7 m] wide lane should be paved at 11 feet [3.3 m] wide). The second pass will then be paved 13 feet (4.0 m) wide, for a total road width of 24 feet (7.3 m). Center line markings will then be applied on a fresh, warm mat during paving of the adjacent lane, at least 4 inches (10 cm) from the asphalt seam.

#### 2. Compact the fresh asphalt.

#### 3. Premark the road.

Use 200-250 feet (60-70 m) of sash, chain or thin wire cable as a guide for long line applications or snap chalk lines on the asphalt. For skip line application, mark the skip sequence on a sash chain or with chalk or paint to be followed by the pointer on a tape applicator. (See Figure 2.)

Example: A sash chain marked to the proper skip sequence with 1-inch (2.5 cm) spiral key rings.

#### 4. Test the asphalt surface.

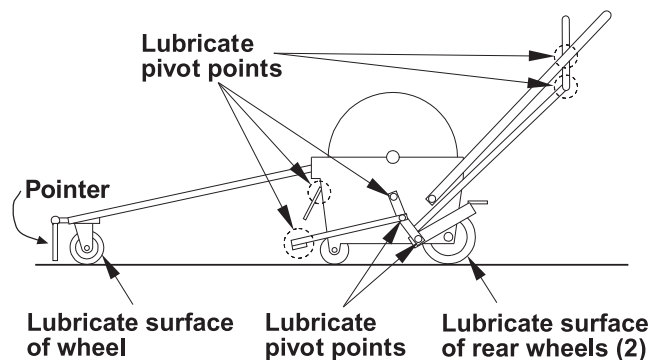
The pavement surface must be soft enough to allow the marking to be inlaid by the steel-drum finishing roller (a ten-ton finishing roller is recommended).

Generally, the desired surface temperature will be between 130°F (54°C) and 160°F (71°C). Using a surface thermometer, test the temperature of the asphalt surface. There is no minimum air temperature requirement for an inlay tape application; however, be advised that cooler air temperatures will result in faster cooling of the asphalt reducing the application window.

**Note:** If you are using a stiffer mix, rubber-based mix (rubberized asphalt), Superpave, OGFC (Open Grade Friction Course) or SMA (Stone Matrix Asphalt), you may need to increase the temperature at which the tape is recessed with a finishing roller to reach the desired amount of embedment into the surface. Inlay the tape with the finishing roller while the surface temperature is warm enough to get approximately 50 to 60 percent of the tape's thickness below the asphalt surface. Do not exceed 180°F (83°C).

#### 5. Lubricate the tape applicator.

Prepare the Manual Highway Tape Applicator for use. Spray the rear rubber wheels, front wheel, and pivot points of the tape applicator with 3M™ 5-way Penetrant, WD-40™ or equivalent light oil spray. The rear wheels and pointer wheel should be sprayed regularly to avoid asphalt build-up. *Note: Wheels may also be wrapped with duct tape. Replace regularly to avoid buildup.* (See Figure 2.)



Manual Highway Tape Applicator

Figure 2.

## Inlay Application of Long Lines (continued)

### 6. Procedure for Threading Tape If Using the Manual Highway Tape Applicator.

Load the tape and thread over the 2-inch (5.08 cm) diameter roll, adhesive side up. (Figure 3) Feed the tape in between the side frame connecting rod and the 2 inch aluminum roller, then through the CLAMP to the CUTTER PLATE. Adjust the GUIDE BARS at the sides of the tape rolls to hold them securely in position.

**DO NOT** thread tape over the 1/2 inch diameter side frame connecting rod. This will create excessive unwind tension and stretching of the tape.

**Caution:** Do not activate the cutting knife with the foot pedal while threading tape!



Figure 3

### 7. Apply the tape.

Apply the tape using the Manual Highway Tape Applicator (MHTA). Make sure you do not apply the tape any closer than 4 inches (10.16 cm) from the asphalt seam. (See Figure 4.)

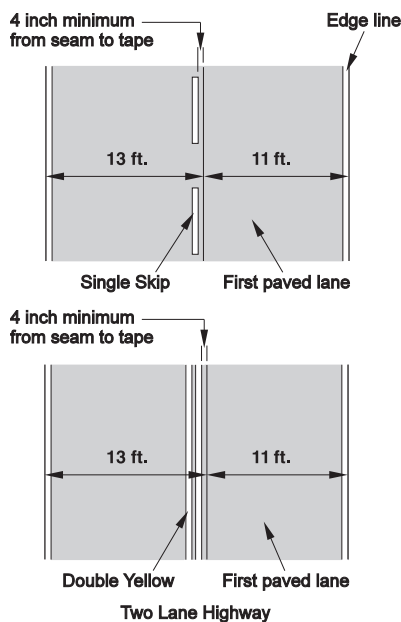


Figure 4.

If pavement markings are applied using the manual highway tape applicator, the weight of the tape applicator roller will be adequate to cause the adhesive to tack with the fresh asphalt prior to rolling with the steel-drum roller. If pavement markings are placed by hand (i.e., shorter, individual skip marks), walk on the tape first to tack the adhesive on the asphalt and then roll the tape using one pass with a Roller Tamper Cart RTC-2 with 50-100 lb. (45 kg) prior to rolling with a steel-drum finishing roller.

### 8. Press the tape into the pavement.

Using a tandem steel-drum finishing roller (no vibration), slowly roll over the tape to press (inlay) it into the warm pavement surface. The tape should always be rolled (first pass) in the same direction it was applied. The speed of the finishing roller should be kept to a minimum (between 2 and 3 mph [3 and 5 kmh]) when rolling over the tape during the first pass. Use a minimum amount of water to clean and lubricate the steel drums during the inlay operation. (See Figure 5.)

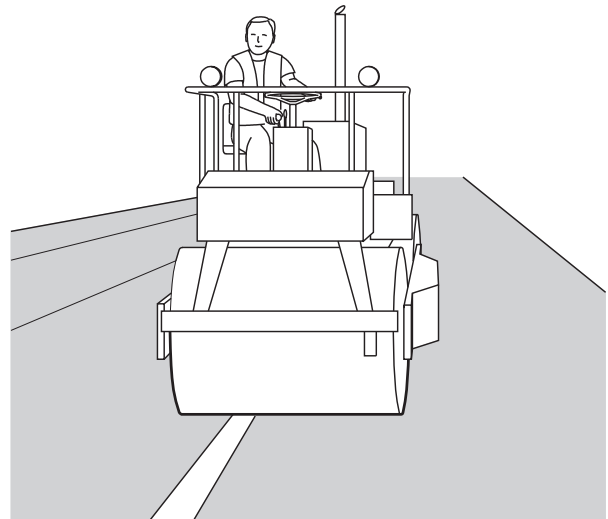


Figure 5.

Note: For best inlay results the weight of the steel-drum roller should be greater than 110 PLI (Pounds per Lineal Inch) of drum width.

$$PLI = \frac{\text{Total weight of roller (pounds)}}{\text{Total length of drums (inches)}}$$

Typically, a 3-5 ton 42 inch wide roller will apply over 140 PLI.

## Inlay Application of Long Lines *(continued)*

Under normal conditions, two passes of the finishing roller is required to inlay the tape. Some stiffer asphalt mixes may need three passes with the finishing roller while the asphalt is still warm in order to inlay the tape properly. An inlay is considered successful when approximately 50 to 60 percent of the tape's thickness is below the asphalt surface. *(See Figure 1 on page 4.)*

*Note: If the tape wrinkles or distorts severely in front of the roller, the mat temperature may be too hot or the roller speed may be too fast. Allow the surface to cool slightly and retry.*

**Do not remove the inlaid tape** since removal of the tape will remove the asphalt.

**9. Repeat Steps 1-8 until the road is fully marked.**

**10. Open the road to traffic.**

As soon as the inlay operations are complete and the asphalt has cooled to temperatures that support vehicles without surface damage, the road may be opened to traffic.

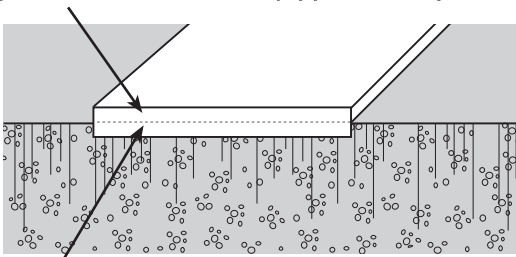
*Note: Tape pattern is important for visibility performance. An improper inlay may cause tape pattern flattening. A measured increase of applied tape width greater than 1/8 inch (3mm) may be an indication that pattern flattening has occurred.*

## Inlay Application of Transverse Markings

*Including crosswalks, stopbars, gore markings, symbols and legends*

3M™ Stamark™ Pavement Marking Tapes with pressure sensitive adhesive (A Series [no liner] and L Series [with liner; also includes precut symbols and legends known as SMS-L Series]) can be applied on fresh asphalt before the finishing roller has passed over the surface. Inlaying is the process of embedding the pavement marking tape into the road surface. This is done by rolling over the applied tape with a finishing roller while the asphalt is still warm. *(See Figure 6.)*

Tape above road surface (Approximately 40-50%)



Partially Embedded Tape (Approximately 50-60%)

Cross Section of the Road

Figure 6.

### PROCEDURE

- 1. Pave a lane.** *(See Step 1 on Page 4.)*
- 2. Compact the fresh asphalt.**
- 3. Premark the road.** Using chalk or keel, outline the area where the marking will be applied.
- 4. Test the asphalt surface.**  
The pavement surface must be soft enough to

allow the marking to be inlaid by the steel-drum finishing roller.

Generally, the desired surface temperature will be between 130°F (54°C) and 160°F (71°C). Using a surface thermometer, test the temperature of the asphalt surface. There is no minimum air temperature requirement for an inlay tape application; however, be advised that cooler air temperatures will result in faster cooling of the asphalt reducing the application window.

**Note: If you are using a stiffer mix, rubber-based mix (rubberized asphalt), Superpave, OGFC (Open Grade Friction Course) or SMA (Stone Matrix Asphalt), you may need to increase the temperature at which the tape is recessed with a finishing roller to reach the desired amount of embedment into the surface. Inlay the tape with the finishing roller while the surface temperature is warm enough to get approximately 50 to 60 percent of the tape's thickness below the asphalt surface. Do not exceed 180°F (83°C).**

**5. Apply the tape.**

Apply the tape by hand.

Cut the tape approximately 12 inches (30.5 cm) short of the asphalt seam or edge. Once the adjacent lane is paved, the tape should meet the end of the tape placed in the first paved lane. Do not overlap the material. Use butt splices. *(See Figure 7.)*

After the next length of tape is placed and butt-spliced with the tape placed during paving of the first lane, the tape will not be inlaid through the 12-inch wide area between the seam and butt splice. To prevent tape loss in snowplow regions from this small area of tape overlay, use a utility

## Inlay Application of Transverse Markings (continued)

knife to score a relief cut across the width of the tape just outside the seam and into the inlay area. (See Figure 7.)

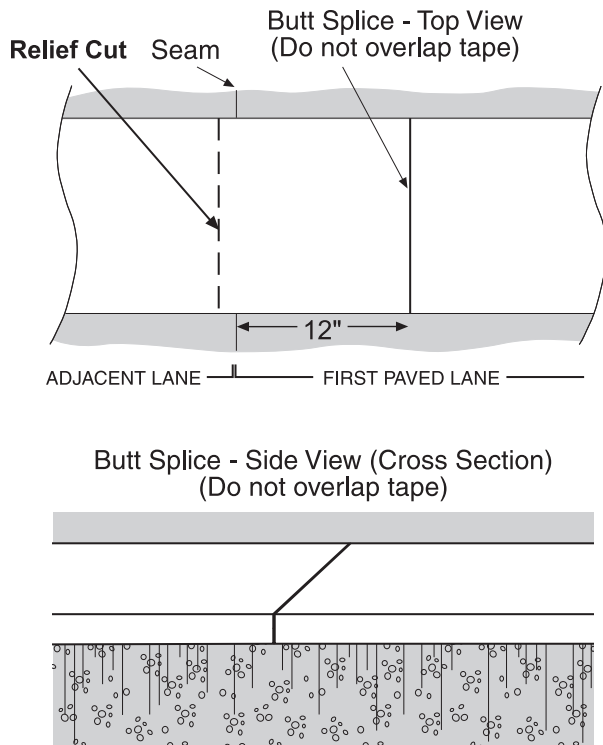


Figure 7.

For material with liner (L Series), including legends and symbols:

Position the marking and peel back the liner. Refer to IF 5.8 for Liner removal techniques. Press the exposed tape down. Slowly remove the rest of the liner as the tape is carefully guided into place.

### 6. Tamp the tape.

Use a Roller Tamper Cart RTC-2 loaded with **100 pounds (45 kg)** (two standard 50-pound weights) to get initial tack of the tape to the asphalt. This tamping of the tape should always be done in the same direction as the marking was applied (lengthwise, not crosswise). **Start in the center of the marking**, then work toward the edges of the tape to remove trapped air. Make sure all the edges of the tape are thoroughly tamped. Do not twist or turn the tamper cart on the tape. One pass over each area is sufficient. (See Figure 8.)

If the tape folds or distorts in front of tamper center, remove one 50 lb weight and continue tamping.

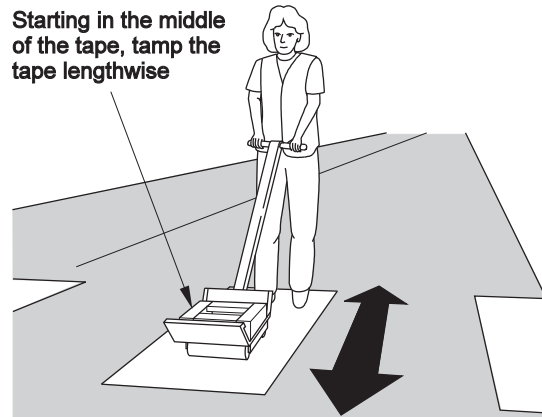


Figure 8.

### 7. Press the tape into the pavement.

Using a tandem steel-drum finishing roller with no vibration, slowly roll over the tape to press (inlay) it into the warm pavement surface. Roll back and forth in a straight line over the same section of tape before moving over to the next section. The speed of the finishing roller should be kept to a minimum (between 2 and 3 mph [3 and 5 kph]) when rolling over the tape. Use a minimum amount of water to clean and lubricate the steel drums during the inlay operation. (See Figure 9.)

Note: For best inlay results the weight of the steel-drum finishing roller should be greater than 110 (Pounds per Lineal Inch) PLI of drum width.

$$PLI = \frac{\text{Total weight of roller (pounds)}}{\text{Total length of drums (inches)}}$$

Use a smaller roller (3-5 ton) for intersection markings if one is available. Smaller rollers are generally more maneuverable and allow the markings to be inlaid more efficiently. It may be possible to inlay intersection markings in a longitudinal direction to the markings if the roller is small and the operator is experienced.

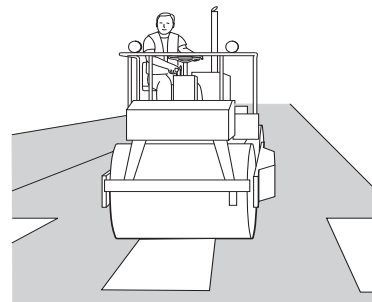


Figure 9.

## Inlay Application of Transverse Markings *(continued)*

Under normal conditions, two passes back and forth of the finishing roller are required to inlay the tape. Some stiffer asphalt mixes may need three passes with the finishing roller while the asphalt is still warm in order to inlay the tape properly. An inlay is considered successful when approximately 50 to 60 percent of the tape's thickness is below the asphalt surface.

**Note:** *If the tape wrinkles or distorts severely in front of the roller, the mat temperature may be too hot or the roller speed may be too fast. Allow the surface to cool slightly and retry. Do not remove the inlaid tape since removal of the tape will remove the asphalt.*

**8. Repeat Steps 1-7 until the road is fully marked.**

**9. Open the road to traffic.**

As soon as the inlay operations are complete and the asphalt has cooled to temperatures that support vehicles without surface damage, the road may be opened to traffic.

*Note: Tape pattern is important for visibility performance. An improper inlay may cause tape pattern flattening. A measured increase of applied tape width greater than 1/8 inch (3mm) may be an indication that pattern flattening has occurred.*

## Overlay Application of Long Lines

*Including edge, lane and channelizing lines*

### PROCEDURE

This procedure explains how to apply tape to a concrete or asphalt surface in the form of edge, lane, and channelizing lines. Before you begin, make sure your environment meets all the product application requirements on page 3.

3M™ Stamark™ Surface Preparation Adhesive P-50 is generally the recommended surface preparation adhesive for long line pavement marking tape application, except in a few specific applications.

Use this chart to determine the proper tape and type of surface preparation adhesive to use.

*(See Appendix B for application coverage guidelines)*

Long line application	Recommended Tape Series	Asphalt 0-3 days old	Asphalt 4-10 days old	Asphalt >10 days old	Concrete (b)
Edge Line	A	None	P-50	P-50	P-50
Center or Lane Line	A	None	P-50	P-50	P-50
Channelization Line	A	None	P-50	P-50	P-50
Edge Line at High Vehicle Crossover Location (a)	A or N	None	None	P-50 (c)	P-50 (c)

*Notes:*

- a. Examples could include edge lines across high volume road access points or high volume crossover traffic through a median area with edge lines.
- b. New concrete surfaces open to traffic less than 90 days must have the curing compound removed prior to application of surface preparation adhesive and pavement markings.
- c. P-50 is the only Surface Preparation Adhesive recommended for use with Series 380AW, 390, 380WR ES, 380I ES, 310 or 270 ES tapes on long line applications.



## Overlay Application of Long Lines (continued)

### 1. Determine road surface conditions.

- If surface is new concrete open to traffic less than 90 days, remove curing compound by sandblasting, shotblasting, light grinding, or hydroblasting.
- If markings exist on the roadway, remove markings from the surface by sandblasting or grinding. A minimum of 90 percent of the road surface under the existing markings must be exposed prior to tape application.
- Applying Stamark Tape over longitudinal joints is not recommended. Premature tape failure can occur as joints can shift and degrade over time. Concrete joints that are wider or deeper than normal can prevent the tape from conforming to the road surface. As joint maintenance is required, the markings can be damaged by maintenance equipment and joint fillers. If application over any joint is necessary, cut the tape 1 inch (2.54cm) away from the joint on both sides.

### 2. Clean the road.

Clean the surface of the road where the tape will be applied. Clean the surface using a high pressure, high velocity compressed air blower with minimum 185 cfm airflow and 120 psi at the air nozzle. There should be no more than 50 feet of 3/4-inch ID hose from the compressor to the air nozzle and the air nozzle should be no less than 1/2-inch ID. The compressor should also be equipped with a moisture and oil trap. It is recommended that the air nozzle be no more than 2 feet from the ground. A street sweeper or pick-up broom may also be effective to remove larger or adhered debris, but will require a final pass with the air compressor to completely clean the surface. The road surface must be dry.

### 3. Premark the road. (See Step 3 on Page 4.)

### 4. Determine if surface preparation adhesive (P-50) is required. Refer to product bulletin for tape to be applied.

- If no adhesive is required, go to Step 7.
- If adhesive is required, go to Step 5.

*Note: If you have any questions, contact 3M Technical Services at 1-800-553-1380. Follow the automatic prompt to reach technical service to determine if surface preparation adhesive is needed.*

### 5. Apply the adhesive (P-50 only).

Using a Spray Applicator PS-14, apply a thin, uniform coat of P-50 adhesive to the pavement. The adhesive should extend at least 1 inch (2.5 cm) beyond the premarked area where the edges of the

tape will be applied. (See Figure 10.) The PS-14 applicator is designed to spray a 6-inch (15.2 cm) wide pattern for application of 4-inch (10.2 cm) wide tape. The typical wet thickness is 6-7 mil.

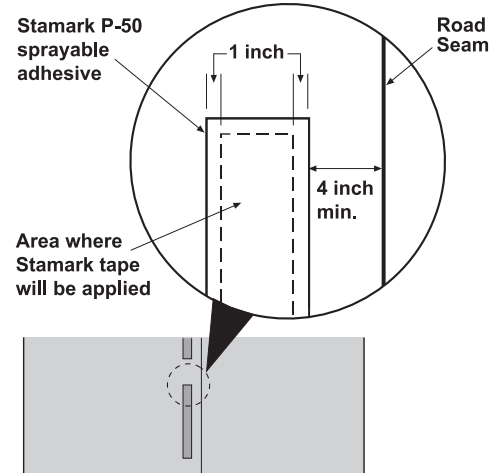


Figure 10.

Adjust the arm of the PS-14 applicator up or down so that the spray pattern is 6 inches (15.2 cm) wide. (See Figure 11.)

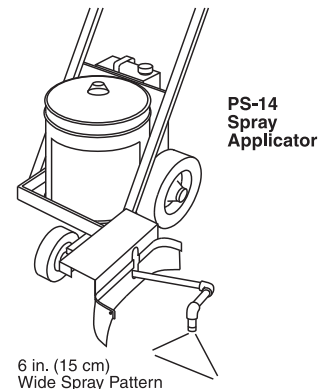


Figure 11.

*Note: If you are using tape wider than 4 inches, spray multiple passes, overlapping the previous pattern by 1-2". Allow additional time for overlapped areas to set. See Appendix B to determine the amount of adhesive that is needed to cover a specific area.*

### 6. Allow the adhesive to set.

Allow the P-50 to set. P-50 is set when it feels tacky but is no longer in liquid form and has a matte finish rather than a glossy wet appearance. P-50 dries quickly (to a set state) under most circumstances. Typical time for P-50 to set is 2 to 3 minutes under optimal conditions of 70°F (21°C) and medium to low humidity levels.

## Overlay Application of Long Lines (continued)

### 7. Procedure for Threading Tape If Using the Manual Highway Tape Applicator.

Load the tape and thread over the 2-inch (5.08 cm) diameter roll, adhesive side up. (Figure 12) Feed the tape in between the side frame connecting rod and the 2 inch aluminum roller, then through the CLAMP to the CUTTER PLATE. Adjust the GUIDE BARS at the sides of the tape rolls to hold them securely in position.

**DO NOT** thread tape over the 1/2 inch diameter side frame connecting rod. This will create excessive unwind tension and stretching of the tape.

**Caution:** Do not activate the cutting knife with the foot pedal while threading tape!



Figure 12

### 8. Apply the tape.

3M™ Stamark™ Pavement Marking Tape may be applied using any of the following methods or equipment:

- a. hand application
- b. MHTA (manual highway tape applicator)
- c. MMHTA (motorized manual highway tape applicator)
- d. 3M HTA (highway tape applicator)
- e. 3M 2000W
- f. 3M 3000T

*Note:* This list is not inclusive and other tape application equipment has been used successfully to apply 3M Stamark tapes. Please contact 3M Technical Service if there are questions about equipment not specifically listed above.

If there is a crack in the pavement or if the tape is to be applied over a bridge expansion joint, lay the tape over the crack or joint, then cut the tape one inch away from the crack or joint on each side.

(See Figure 13.)

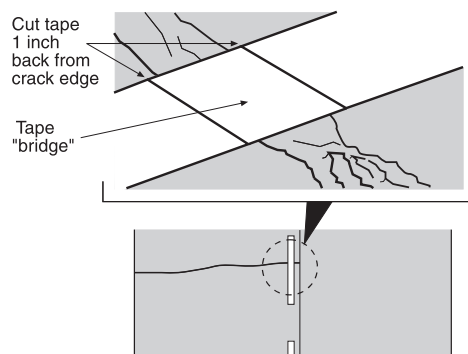


Figure 13.

### 9. Tamp the tape. VERY IMPORTANT!

Tamp the tape thoroughly with the RTC-2 tamper cart with a minimum **200-pound (90-kg)** load, or slowly drive over the tape a minimum of three times with a vehicle. The vehicle must be equipped with a pointing device to aid in keeping the vehicle on the tape, making three passes forward over the tape.

Use a vehicle tire on long line markings only.

**TAMPING IS MOST IMPORTANT!** When using the RTC-2 tamper cart (See Figure 8, Page 7):

- Do not twist or turn the tamper cart on the tape.
- Make a minimum of six passes (three passes back and forth) over each part of the tape.
- Make sure all edges are firmly adhered.

### 10. Open the road to traffic.

## Overlay Application of Transverse Markings

*Including crosswalks, stopbars, gore markings, symbols and legends*

### PROCEDURE

This procedure explains how to apply tape to a concrete or asphalt surface in the form of crosswalks, stopbars, gore markings, symbols and legends. Before you begin, make sure your environment meets all the product application requirements on page 3.

Use this chart to determine the proper tape and type of surface preparation adhesive to use.  
(See Appendix B for application coverage guidelines)

**Notes:** High shear exposures may require the use of E-44T contact cement. Refer to appendix C for guidelines.

Transverse Marking Application	Recommended Tape Series	Asphalt 0-3 days old	Asphalt 4-10 days old	Asphalt >10 days old	Concrete (a)
Crosswalks	A, L or N	None	None	E-44T (b) or P-50 (f)	E-44T (b) or P-50 (f)
Stop Bars	A, L or N	None	None	E-44T (b) or P-50 (f)	E-44T (b) or P-50 (f)
Symbols & Legends	L or N	None	P-50	E-44T (b) or P-50 (f)	E-44T (b) or P-50 (f)
Gore Markings in Minimal Traffic Area (c)	A or N	None	P-50 (e)	P-50 (f)	P-50 (f)
Gore Markings in Heavy Traffic Area (d)	A or N	None	None	E-44T (b) or P-50 (f)	E-44T (b) or P-50 (f)

- a. New concrete surfaces open to traffic less than 90 days must have the curing compound removed prior to application of surface preparation adhesive and pavement markings.
- b. Three-coat E-44T method required for N-series tape application (roller applied).
- c. Gore markings in minimal traffic areas include gores at highway on-ramps and off-ramps where minimal traffic crosses over the pavement markings.
- d. Gore markings in heavy traffic areas include hatched median areas along urban roadways where high levels of traffic cross over the pavement marking.
- e. P-50 may be used for gore areas with minimal to no cross-over traffic..
- f. P-50 and E-44T are the only Surface Preparation Adhesives (roller applied) recommended for use with Series 380AW, 390, 380WR ES, 380I ES, 310 and 270 ES tapes for transverse marking application.

**See Appendix C for guidance on the use of E-44T based on road type.**

## Overlay Application of Transverse Markings (continued)

### 1. Determine road surface conditions.

- a. If surface is new concrete open to traffic less than 90 days, remove curing compound by light grinding, sandblasting, shotblasting or hydroblasting.\*
- b. If markings exist on the roadway, remove markings from the surface by hydroblasting, sandblasting or grinding. A minimum of 90 percent of the road surface under the existing markings must be exposed prior to tape application.

\*Note: Hydroblasting requires a 24 hour waiting period before tape application

### 2. Clean the road.

Clean the surface of the road where the tape will be applied. Clean the surface using high velocity, high pressure compressed air blower with minimum 185 cfm airflow and 120 psi at the air nozzle (recommended). The road surface must be dry.

**3. Premark the road.** Layout the area where the marking will be applied.

**4. Determine if surface preparation adhesive is required.** (See table on page 3.) For additional information on application refer to the product bulletin and information folder for the tape being applied.

- a. If no adhesive is required, go to Step 11.
- b. If adhesive is required, go to Step 5.

### 5. Stir the adhesive. (E-44T only.)

Stir and thoroughly mix the E-44T adhesive with a wide wooden paint paddle or air driven paint mixer. Make sure any sediment on the bottom of the 5-gallon container is completely stirred into a consistent solution. (See Figure 14.)



Figure 14.

### 6. Apply the adhesive.

- a. If using P-50 adhesive on asphalt 4-10 days old, see Step 5 on Page 9.
- b. If using P-50 or E-44T for an intersection or and transverse making - including legends and symbols - evenly apply one coat of adhesive to the road surface using a solvent-resistant roller with a minimum 3/8-inch (2.0 cm) nap. The coating on the pavement must extend at least 1 inch (2.5 cm) beyond the premarked area. (See Figure 15.)

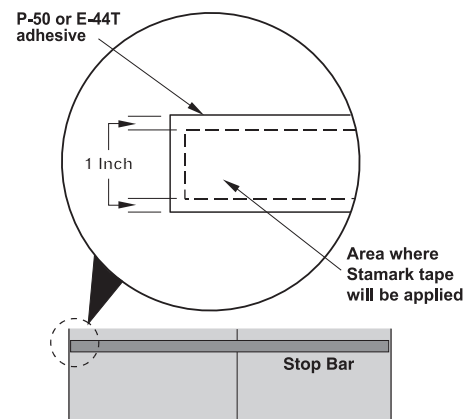


Figure 15.

## Overlay Application of Transverse Markings (continued)

### 7. Allow the adhesive to set.

It is very important that the surface preparation adhesive is set to prevent the tape from sliding after application. If the surface preparation adhesive is not allowed to set, it will not bond properly to the adhesive on the tape and adhesion failure will likely occur. Surface preparation adhesive is set (see Figure 16) when it feels tacky but will not lift or string when touched with fingertips protected with gloves. The time needed for the E-44T to set is approximately 5 minutes under optimal conditions of 70°F (21°C) and medium to low humidity. Set time will change depending on climate conditions. Typical time for P-50 to set is 2 to 3 minutes under optimal conditions of 70°F (21°C) and medium to low humidity levels. (See Figure 16.)

*Note: If E-44T dries to a tack free state, apply a second coat.*

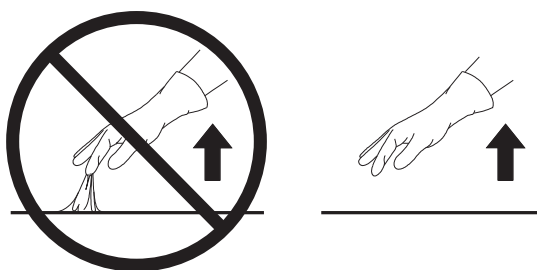


Figure 16.

### 8. Remark the road (if needed).

### 9. Determine next step, based on tape series being used.

- If tape is Series A (with adhesive), *go to Step 11.*
- If tape is Series L (with adhesive and a liner), then *go to Step 11.*
- If tape is Series N (no adhesive and no liner), *go to Step 10.*

### 10. Apply a second coat of adhesive to the road surface and a single coat to the back side of the tape. (N Series [tape with no adhesive or liner] only).

Allow adhesive to “set”. It is very important that the adhesive is set to prevent the tape from sliding after application. The adhesive is set when it will not lift or string but does feel tacky when touched with fingertips protected with gloves. The time needed for the E-44T to set is approximately 5 minutes under optimal conditions of 70°F (21°C) and medium to low humidity. Set time will change depending on climate conditions. (See Figure 16.)

**Important Note:** a. E-44T forms a skin as it dries so a firm pressing to the E-44T surface is needed to determine if it is set. No blisters or strings of adhesive should come away with the finger as it is removed.

b. Always check in different areas and especially depressions in the road surface where more E-44T may be present and slower to dry.

### 11. Apply the tape by hand.

Apply the tape by hand. When splicing is required, do not overlap the material. Use butt splices. (See Figure 17.)

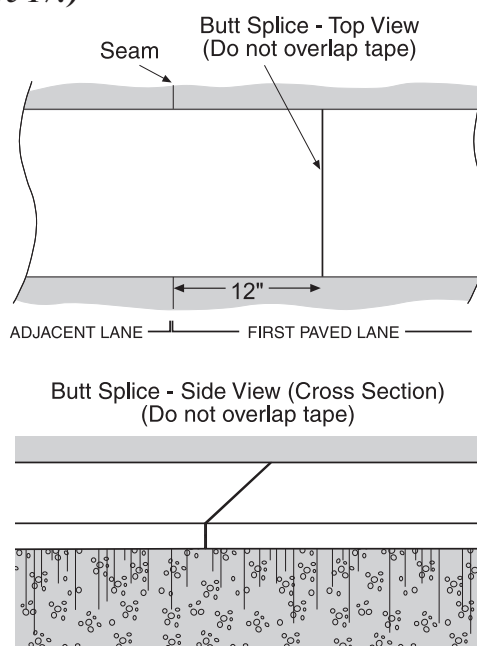


Figure 17.

*Note:* If there is a crack in the road that causes the tape to bridge, lay the tape over the crack, tamp the tape, and then cut the tape one inch from each side of the crack. (See Figure 18.)

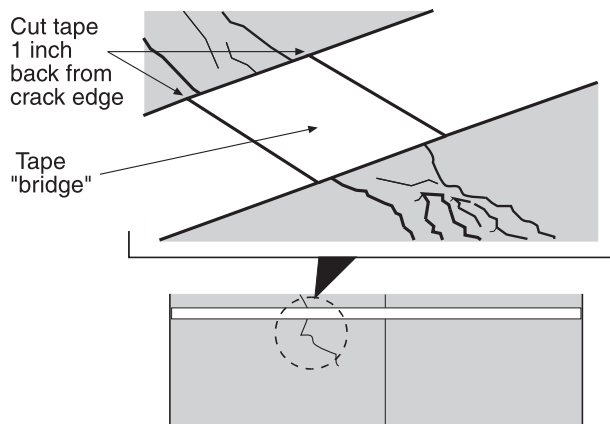


Figure 18.

## Overlay Application of Transverse Markings *(continued)*

Use this same technique on concrete when the transverse marking is applied over a joint: Cut the tape 1 inch back from each side of the joint.

For material with liner (L Series): Refer to IF 5.8 for liner removal techniques

Position the marking and peel back the liner. Press the exposed tape down. Slowly remove the rest of the liner as the tape is carefully guided into place. Refer to IF 5.8 for liner removal.

### 12. Tamp the tape.

Tamp the tape thoroughly with the RTC-2 tamper cart with a minimum **200-lb. (90-kg)** load. (*See Figure 19.*)

- Start in the center of the marking.
- Do not twist or turn the tamper cart on the tape.
- Make six passes (three passes back and forth) over each part of the tape.
- Make sure all edges are firmly adhered.  
*Note:* Do not use a vehicle tire to tamp transverse markings!

### 13. Open the road to traffic.

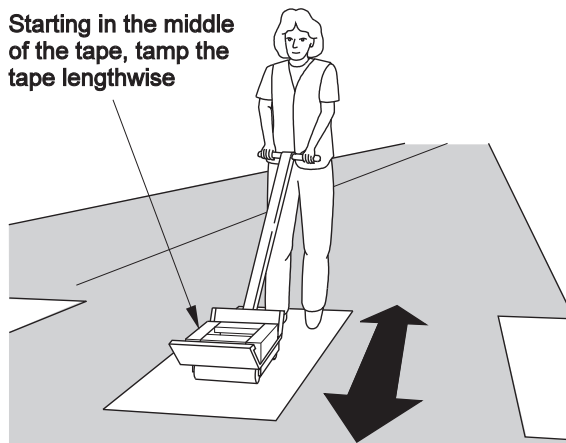


Figure 19.

## Additional Information

### STORAGE

3M™ Stamark™ Tapes, Stamark™ Surface Preparation Adhesive P-50 and Stamark™ Contact Cement E-44T must be stored in a cool, dry area indoors. A storage temperature of 40-100°F (4-38°C) is recommended. Use all tape products within one year of receipt. Unopened containers of P-50 must be used within two years of receipt. Check label for expiration date of receipt.

### REMOVAL

Stamark tapes are designed for permanent, non-removal applications. Contact your 3M representative for guidance concerning removal of Stamark tapes.

### HEALTH AND SAFETY

Read all health hazard, precautionary and first-aid statements found in the Material Safety Data Sheet (MSDS) and/or product label of chemicals prior to handling or use. Also refer to the MSDS for information about the volatile organic compound (VOC) content of chemical products. Consult local regulations and authorities for possible restrictions on product VOC content and/or VOC emission.

Personal protective equipment may be appropriate for safely installing these products in a work zone environment. For example, eye, ear, and respiratory protection may be appropriate during grooving, surface preparation, or for the removal of existing pavement markings. Always follow safe work zone practices.

### CAUTION

- Gloves should be worn when using any Stamark tapes to prevent injury to hands.
- Do not use a flame or torch to remove Stamark tapes. Burning may violate local, state or federal air quality regulations. Also, exposing the tape to very high temperatures with the use of a flame or torch could generate emissions that may be harmful to skin, eyes and respiratory system.

## Appendix A. Pavement Surface Types

The pavement surface type and age determine which application procedures for 3M™ Stamark™ Pavement Marking Tapes should be used. For pavement types not covered, contact your 3M representative.

### ASPHALTIC CEMENT CONCRETE (ACC)

#### Standard Mix Asphalt

A standard mix contains both fine (sand) and large (1/4-inch [6-mm]) aggregate with an asphalt cement binder. Stamark tapes can be inlaid or overlaid on this surface.

#### Open Grade Friction Course

An open grade friction course mix consists of only large aggregate, up to 3/4 inches (19 mm), with an asphalt cement binder. Stamark tapes can be inlaid or overlaid on this surface. Refer to the inlay application section of this folder for further explanation, beginning on page 4.

#### Chip Seal

A chip seal is achieved by spraying a hot asphalt emulsion onto an existing surface and then covering it with a 1/4-inch (6.4-mm) aggregate. Excess aggregate is removed after several days of exposure to traffic. Stamark tapes can be overlaid on this surface after the loose aggregate is removed and the surface has cured.

#### Slurry Seal

A slurry seal is a hot asphalt emulsion that is sprayed onto an existing surface, as a top coat dressing only. No aggregate is added. Stamark tape can be overlaid on this surface after the road has been open to traffic for three days.

#### Recycled Asphalt

This road surface consists of an existing asphalt that is removed through milling or grinding, reprocessed and then reapplied. Stamark tape can be inlaid or overlaid on this surface.

#### Rubberized Asphalt

Rubberized asphalt mixes contain additives designed to increase durability. The mix can be either a “standard mix” or an “open grade friction course” mix. Stamark tape can be applied as noted under the appropriate headings in this information folder.

### PORTLAND CEMENT CONCRETE (PCC)

#### New Concrete

During construction, the new surface is often brushed or grooved (tined). Concrete that has been open to traffic less than 90 days must have the curing compound removed before applying Stamark tapes or surface preparation adhesive. Sandblasting is the method commonly used to remove curing compound from new concrete. Other methods, such as shot-blasting or hydro-blasting, can also be used. In the case of hydro-blasting, the pavement must be allowed to dry before the surface preparation adhesive and tape are applied.

#### Old Concrete

Old concrete is a PCC surface that has been open to traffic for more than one year and is showing signs of wear. Often this surface is smooth with large amounts of exposed, polished aggregate. Stamark tape can be overlaid using a surface preparation adhesive. The old concrete surface may require texturing prior to surface preparation adhesive and tape application. Contact a technical service representative at 1-800-553-1380 for additional information.



## Appendix B. Surface Preparation Adhesives

Two surface preparation adhesives are commonly available for application of Stamark pavement marking tapes: Stamark E-44T contact cement and Stamark surface preparation adhesive P-50.

### A. E-44T Contact Cement

E-44T contact cement is used with the roller applied 3-Coat Method to apply all N-Series (no adhesive) intersection markings including stop bars, crosswalks, symbols, channelizing lines and gore markings. It is applied using a long-handled, thick (3/4 -inch [2-cm]) nap paint roller with a solvent-resistant core. Refer to the section, “Overlay Application of Transverse Markings,” for complete surface preparation and adhesive application procedure, beginning on page 11.

*Note: E-44T is recommended for ES tapes in high shear exposures. Refer to Appendix C for more detail.*

### Stamark Tapes Non-Adhesive Coated (N Series only)

A three-coat system is used: One uniform coat of E-44T contact cement is roller applied first to the road surface and allowed to set. A second coat is then applied to the road surface and a single coat is applied to the nonreflective (bottom) side of the tape and allowed to set. Traffic must be kept off the coated surface prior to tape installation.

*Note: E-44T Contact Cement can be applied to all road surfaces except for new, 0 to 10 day old asphalt. When applying to new concrete (PCC) opened to traffic for less than 3 months, the curing compound must be removed by sandblasting light grinding, hydroblasting, or shotblasting.*

### B. Surface Preparation Adhesive P-50

P-50 sprayable adhesive is applied using the PS-14 spray applicator or an airless or a compressed air sprayer as found on a highway striping paint truck.

For a compressed air sprayer, adjust as needed to achieve target application rate as listed in chart #3. It is designed to be used as a surface preparation adhesive for long-line applications.

It is also applied using a long-handled, thick (3/8 inch [0.95cm]) nap paint roller with a solvent-resistant core.

### C. Coverage for E-44T and P-50 Adhesives

See Chart 3 below to determine how much adhesive you need to cover a specific area.

Chart 3

Adhesive Type	One Coat	Three Coats
E-44T Contact Cement Roller Application	75 sq. ft./gallon (1.8 sq. m/liter) (3/4 inch Nap) metric	25 sq. ft./gallon (0.6 sq. m/liter)
P-50 Surface Preparation Adhesive Spray Application	One coat sprayed at a 6-inch (15-cm) width for a 4-inch (10-cm) line covers approximately 450 lineal ft./gallon (35 lineal meters/liter) or 225 sq. ft./gallon (5.3 sq. m/liter)	N/A
P-50 Roll Application	75 sq. ft./gallon (1.8 sq. m/liter) (3/8 inch Nap) metric	N/A

## Appendix C. Road Type Surface Preparation Adhesive Application Recommendations

Road lanes are typically exposed to different levels of traffic shear exposure. Road lanes that are exposed to a high frequency of high shear turning; especially by trucks and other large vehicles require use of E-44T Contact Cement for application of Stamark pavement marking tapes. The following table summarizes the product and surface preparation adhesive application recommendations by shear condition:

**Important Note: Refer to Overlay Application of Transverse Markings sections starting on page 11.**

Contact 3M Technical Service at 1-800-553-1380 for questions on E-44T applications.

Shear Level	Product and Adhesive Recommendation
↑ Very High Shear	Stamark Tape "N" Series Use 3 Coats of E-44T
High Shear	Stamark Tape "A" and "L" Series Use One Coat of E-44T
Moderate Shear	Stamark Tape "A" and "L" Series Use P50
Low Shear	Stamark Tape "A" and "L" Series

Within the Climate Guide Recommendations

## Literature Reference

**For additional information on 3M™ Stamark™ Pavement Marking Tapes, application recommendations, or 3M application equipment, refer to the following publications:**

- Product Bulletin 310      3M™ Stamark™ Pavement Marking Tape Series 310
- Product Bulletin 380AW   3M™ Stamark™ High Performance All Weather Tape Series 380AW
- Product Bulletin 380I ES   3M™ Stamark™ High Performance Tape Series 380IES
- Product Bulletin 380I-5ES   3M™ Stamark™ High Performance Tape Series 380I-5ES
- Product Bulletin 380WR ES   3M™ Stamark™ High Performance Wet Reflective Tape Series 380WR ES
- Product Bulletin 380WR-5ES   3M™ Stamark™ High Performance Wet Reflective Contrast Masking Tape Series 380WR-5ES
- Product Bulletin 270 ES   3M™ Stamark™ Pavement Marking Tape 270ES
- Product Bulletin 390      3M™ Stamark™ High Performance Tape Series 390
- Product Bulletin 390-5    3M™ Stamark™ High Performance Contrast Marking Tape
- Information Folder 5.2    Highway Tape Applicator (HTA)
- Information Folder 5.8    Application of 3M™ Stamark™ Precut Symbols and Legends
- Information Folder 5.13   3M™ Stamark™ Contact Cement E-44T
- Information Folder 5.17   3M™ Stamark™ Surface Preparation Adhesive P-50
- Information Folder 5.18   Guidelines for Pavement Marking Applications in Grooved Pavement Surfaces
- 3M Climate Guide        Climate Guide for 3M™ Stamark™ Pavement Marking Tapes
- 3M Road Surface Guide    Road Surface Guide for 3M™ Stamark™ Pavement Marking Tapes.

**FOR INFORMATION OR ASSISTANCE**

**CALL:**

**1-800-553-1380**

**IN CANADA CALL:**

**1-800-265-1840**

**Internet:**

**[www.3M.com/tss](http://www.3M.com/tss)**

3M assumes no responsibility for any injury, loss or damage arising out of the use of a product that is not of our manufacture. Where reference is made in literature to a commercially available product, made by another manufacturer, it shall be the user's responsibility to ascertain the precautionary measures for its use outlined by the manufacturer.

**Important Notice**

All statements, technical information and recommendations contained herein are based on tests we believe to be reliable, but the accuracy or completeness thereof is not guaranteed, and the following is made in lieu of all warranties, or conditions express or implied. Seller's and manufacturer's only obligation shall be to replace such quantity of the product proved to be defective. Neither seller nor manufacturer shall be liable for any injury, loss or damage, direct, special or consequential, arising out of the use of or the inability to use the product. Before using, user shall determine the suitability of the product for his/her intended use, and user assumes all risk and liability whatsoever in connection therewith. Statements or recommendations not contained herein shall have no force or effect unless in an agreement signed by officers of seller and manufacturer.

3M, Stamark and the "waffle pattern" are trademarks of 3M. Used under license in Canada.



**Traffic Safety Systems Division**

3M Center, Building 235-3A-09  
St. Paul, MN 55144-1000  
1-800-553-1380  
[www.3M.com/tss](http://www.3M.com/tss)

**3M Canada Company**

P.O. Box 5757  
London, Ontario N6A 4T1  
1-800-3MHELPS

**3M México, S.A. de C.V.**

Av. Santa Fe No. 55  
Col. Santa Fe, Del. Alvaro Obregón  
México, D.F. 01210

Please recycle.  
© 3M 2011. All rights reserved.  
Bolger 11060544  
Electronic Only