

Transportation Safety Division

# 3M™ Linear Delineation System Series 340

Product Bulletin Series 340  
January 2019

Replaces PB 340 Dated April 2011

## 1 Description

The 3M Linear Delineation System Series 340 (“LDS”) is intended for the linear reflectorization of concrete barriers and metal guardrails. Linear delineation system panels are fabricated from 3M™ Diamond Grade™ Reflective Sheeting, laminated onto thin-gauge aluminum and formed into a unique shape that provides retroreflection across a wide range of entrance and observation angles.

Linear delineation system panels can be used in a variety of applications, including bridge abutments, concrete or metal pillars and posts, and utility boxes. 3M recommends testing all installation surfaces for proper adhesion. See [Technical Bulletin, Surface Preparation for 3M™ VHB™ Tape Applications](#).

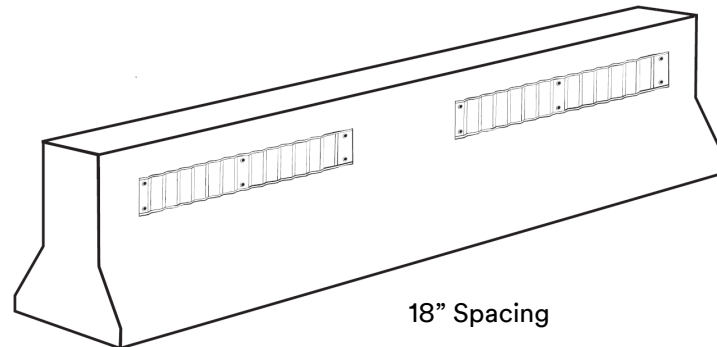
1.5” wide LDS panels have been designed for use on guardrails and concrete barriers and include pre-applied 3M VHB tape on their back sides. 1.5” wide LDS panels are easily installed into the trough (or “W”) grooves of guardrails.

4” and 6” wide panels are available in 34” lengths. 1.5” wide panels are available in 31” lengths.

**Table 1.** Available Widths by Color

Color	Available Widths (inches)
White	1.5, 4, 6
Fluorescent Yellow – FY	1.5, 4, 6
Fluorescent Orange – FO	4, 6
Red	4, 6

LDS panels provide continuous linear delineation when installed edge to edge. If LDS panels are to be spaced for daytime or nighttime contrast, 3M recommends using a spacing of 18" between panels. This spacing is especially effective when panels are installed at locations leading into and around curves (e.g. cloverleaf entrances). If LDS panels are spaced on a barrier or guardrail that runs parallel to traffic, there should be no more than 36" between panels. For example, on a typical 10' concrete barrier, two LDS panels should be spaced 18" apart (see Figure 1).



**Figure 1.** Two linear delineation system panels spaced 18" apart on a 10' concrete barrier.

## 2 Average Installation Time Using VHB™ Tape Method

### Concrete Installation:

- 4 person crew - 120 panels/hour
- 2 person crew - 60 panels/hour

### Guardrail Installation:

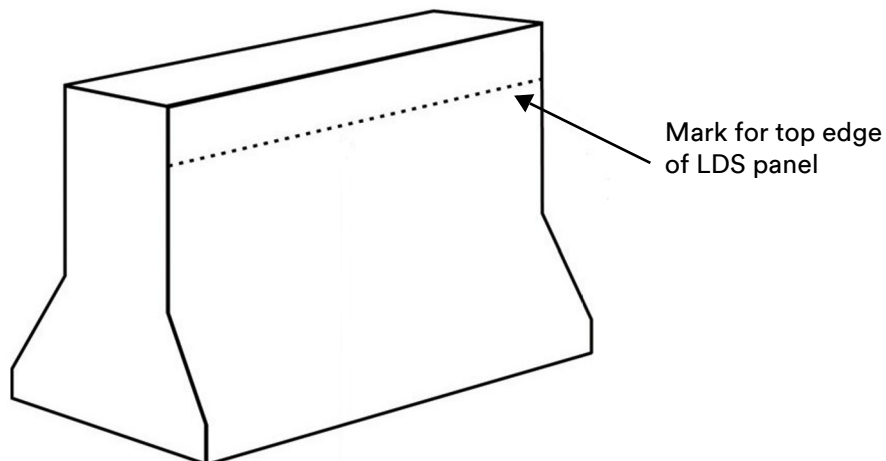
- 2 person crew - panels 50/hour

## 3 Installation Preparation

It is the responsibility of the installer to contact a 3M sales representative or 3M application engineer whenever there is a question regarding application procedures or substrate conditions (1-800-553-1380).

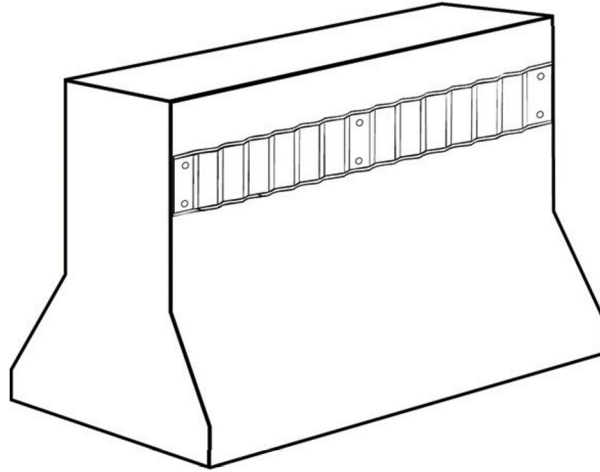
### 3.1 Concrete Barriers

To assure a straight and level application, snap a chalkline to which LDS panels can be aligned, as shown in Figure 2.



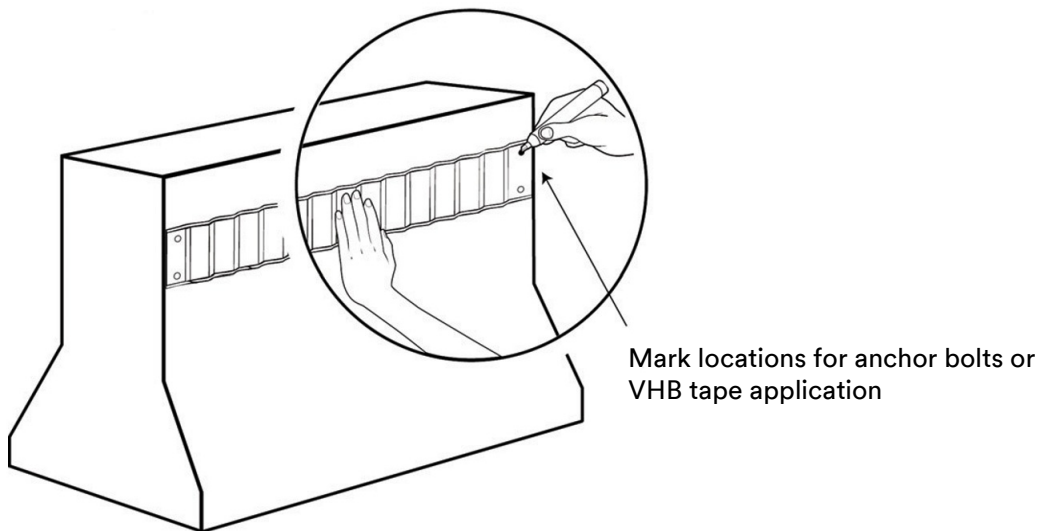
**Figure 2.** Mark the location of the top edge of the LDS panel with chalkline prior to installation.

To avoid dirt, snow, salt, and road grime, install LDS panels near the tops of barriers, as seen in Figure 3.



**Figure 3.** LDS panel installed near the top of a barrier to avoid dirt, snow salt, and road grime.

Using a black marking pen, mark where panels are to be mounted on the barrier at their mounting points, as shown in Figure 4.



**Figure 4.** Mark mounting point locations with black marking pen prior to LDS panel installation.

## 4 Application Instructions for Concrete

### 4.1 3M™ VHB™ Tape Method

VHB Acrylic Foam Tape 5962 is a double-coated, 1.6 mm thick, pressure sensitive adhesive tape suitable for use on a wide range of substrates, including concrete. When installing LDS panels with VHB tape, 3M™ Hi-Strength 90 Spray Adhesive - Low VOC <25% must be used to unify the surface and improve tape adhesion.

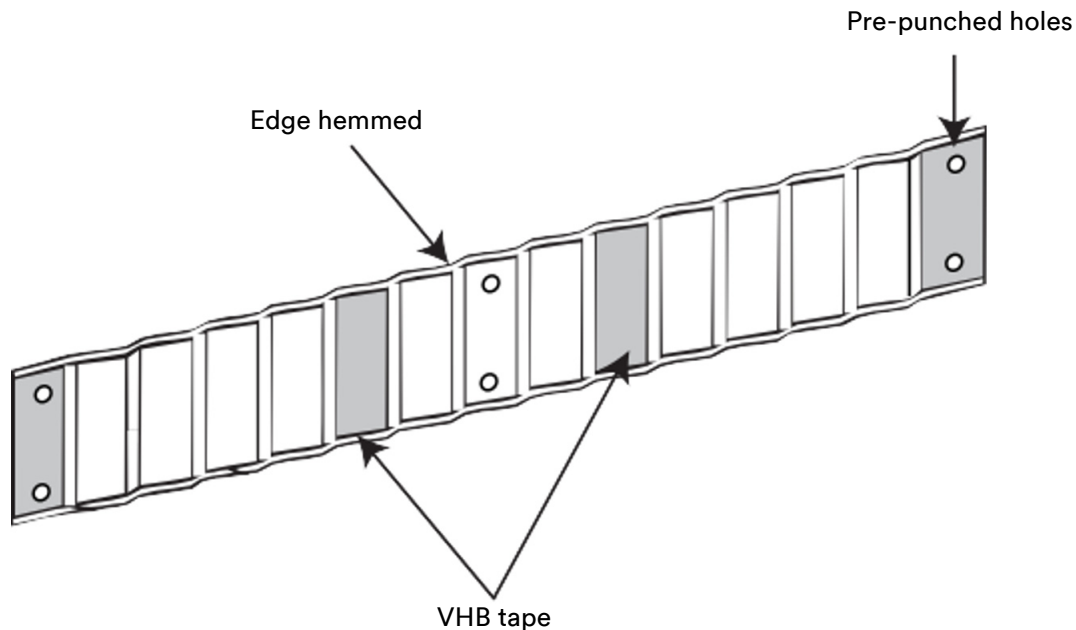
**Note:** 3M Hi-Strength 90 Spray Adhesive - Low VOC <25% must dry or cure for 15 minutes (until tacky to finger touch) before 3M VHB tape is applied.

Do not installation onto concrete surfaces with excessive grime, oil, grease, or loose paint. Ensure installation surface is clean, dry, and free of dust, oil, and grease before applying LDS panels.

#### 4.1.1 Installation procedure:

- Apply at a temperature of at least 50 °F (10 °C) and rising
- Remove dirt from concrete surface using wire brush
- Remove loose particles and dust using high velocity air
- Apply 3M Hi-Strength 90 Spray Adhesive - Low VOC <25% or other recommended adhesive primer to the surface to which VHB tape is to be applied
- Allow primer to cure until tacky to finger touch
- Remove backing from VHB tape and press linear delineation system panels firmly into place (avoid pressing on raised surfaces of panels)
- Use pre-cut strips of VHB tape (6" and 4" strips are available and can be purchased from 3M) to apply panels to concrete substrates

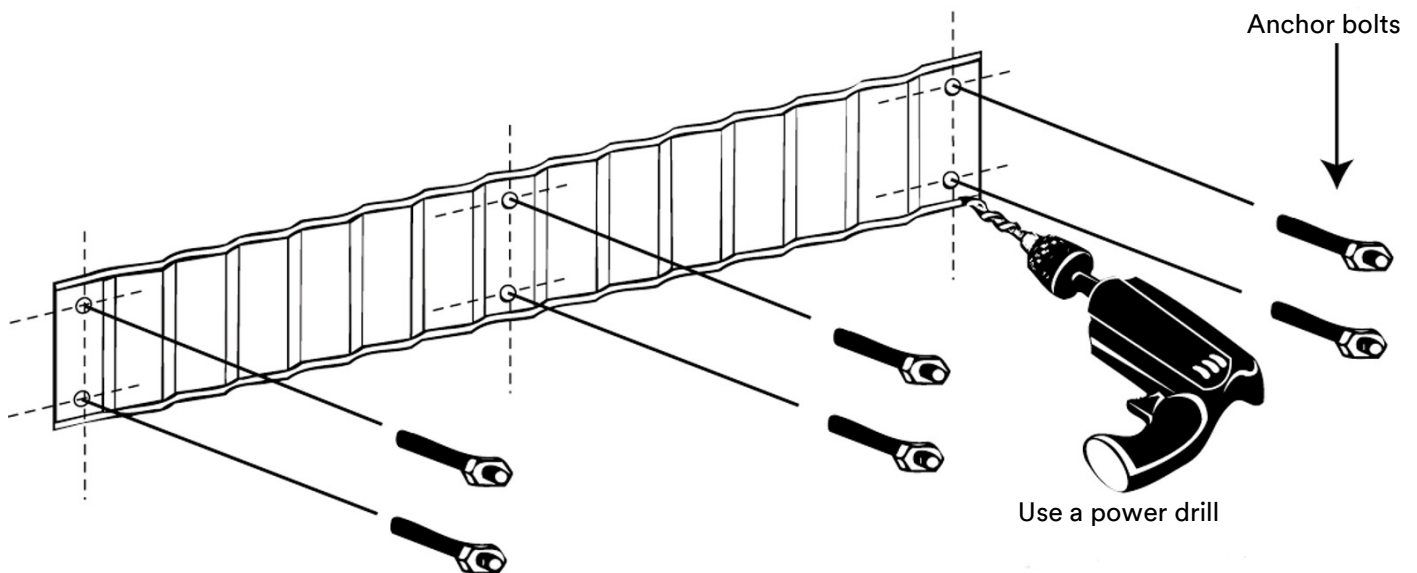
**Note:** Roller pressure or adequate hand pressure must be applied to the linear delineation system panel at all VHB tape locations.



**Figure 5.** Parts of a LDS panel that has been prepared for installation.

## 4.2 Anchor Bolt Method

Once panel anchor locations have been marked on barriers, drill holes using a rotary hammer drill equipped with a concrete drill bit. LDS panels are pre-drilled and can be used as drilling jig fixtures for concrete applications, as shown in Figure 6.



**Figure 6.** Install anchor bolts using LDS panel as drilling jig.

After drilling anchor holes, hammer in 1/4" x 1" stainless steel anchors, such as Hilti® Stainless Steel Metal Hit Anchor 304 Model #230520/9, which can be removed if necessary. When using other anchors, include a 5/16" nylon washer at each anchor.

**Note:** Adhesive caulking (similar to the 3M™ Windo-Weld™ Super Fast Urethane (#08609) discussed in Section 5.3) can be used to aid in the alignment of panels to chalk lines prior to drilling through the pre-drilled LDS holes. 3M Windo-Weld Super Fast Urethane adheres quickly at temperatures ranging from 60-100 °F and can be used to install LDS panels to concrete only in conjunction with the Hilti Anchor 304 anchoring system.

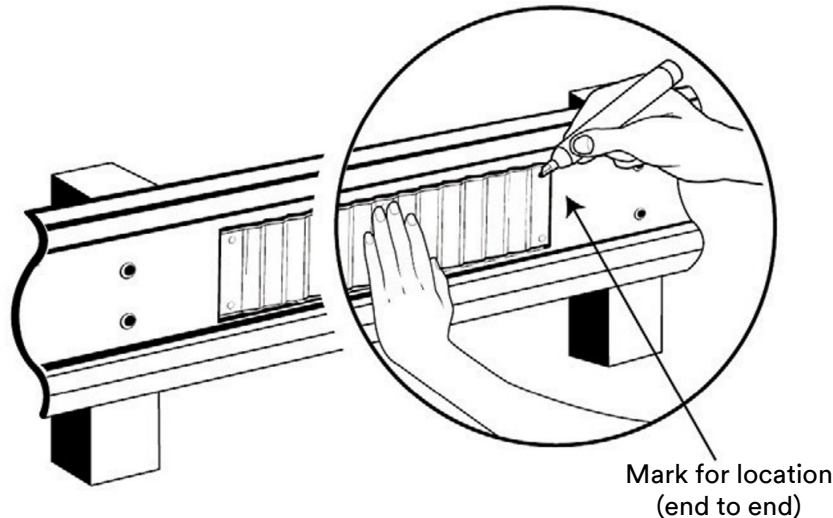
**Note:** Other anchor systems, including drilled mechanical fasteners and concrete epoxy systems, can be used to attach LDS panels to concrete. The end user is responsible for testing the durability and strength of any other potential anchor or epoxy system and determining its suitability.

## 5 Application Instructions for Standard Galvanized Metal Guardrails

### 5.1 Application of 1.5" Panels

**Panel Width** - 1.5" wide LDS panels fit standard guardrails.

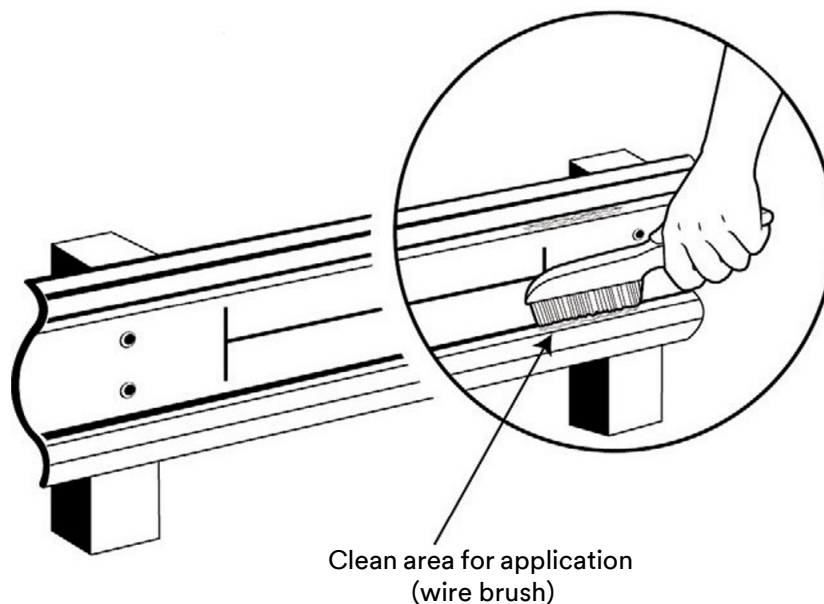
**Panel Position** - Check suitability of spacing recommendations for each application. Spacing distances depend upon guardrail configuration and construction. Where possible, avoid applying panels over bolt heads and seams to ensure the best possible adhesion to the guardrail surface. Mark guardrail locations where LDS panels are to be installed, as shown in Figure 7.



**Figure 7.** Mark LDS panel installation locations.

### 5.2 Surface Preparation and Cleaning

Once the guardrail has been properly marked for installation, use a wire brush to clean any surface dirt from the application area, as shown in Figure 8. Next, lightly clean the guardrail with rubbing alcohol or isopropyl alcohol. Allow alcohol to dry before installing LDS panels.

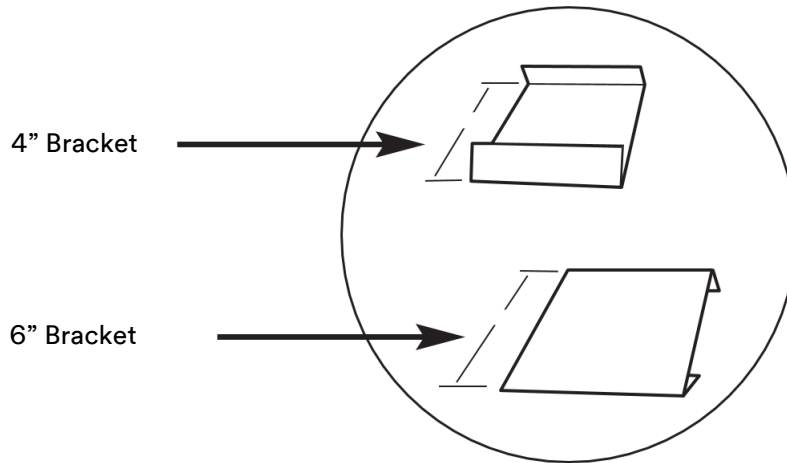


**Figure 8.** Clean guardrail first with wire brush, then with rubbing alcohol or isopropyl alcohol. Allow alcohol to dry before installing panels.

Once the guardrail is clean and dry, apply the LDS panels using VHB™ tape by removing tape liners and pressing the panels firmly to the guardrail. Avoid pressing on the raised areas of panels.

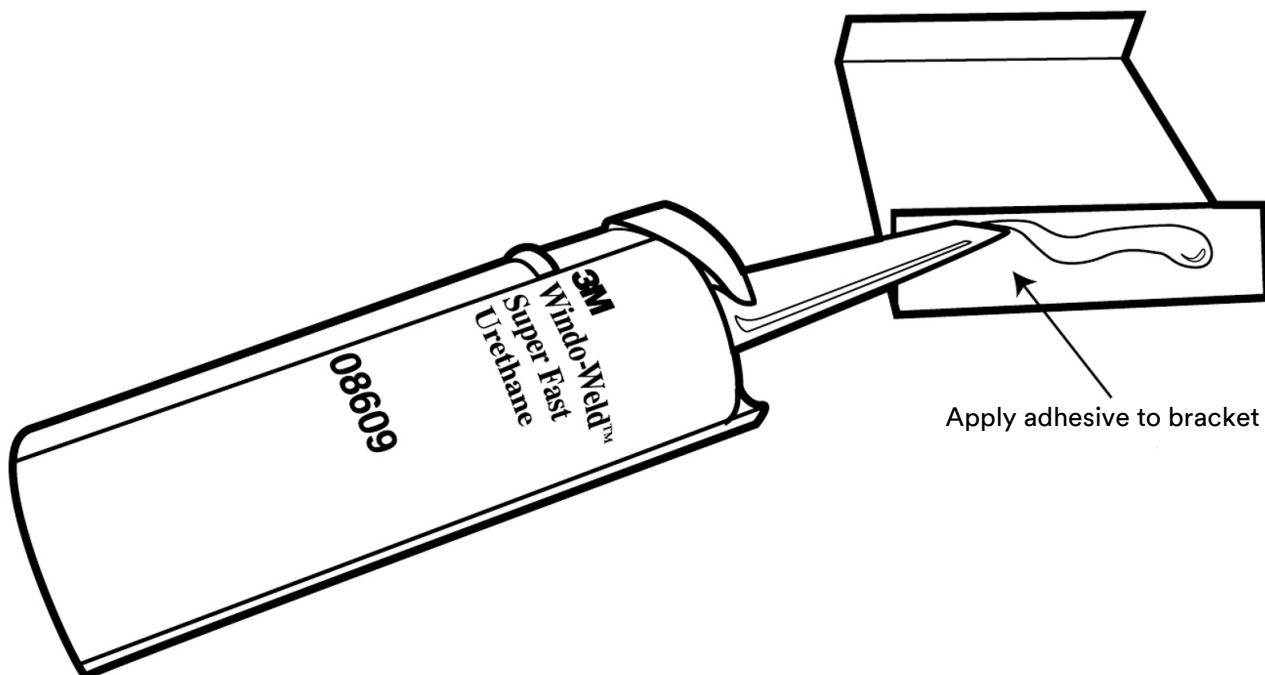
### 5.3 Application with Brackets

As shown in Figure 9, brackets come in two widths, 4" and 6", and the width of the bracket used must match that of the LDS panel being installed. Use three brackets for each panel, regardless of panel width. Brackets are available in packages of 150 and are labeled as either LDS-4B (4" brackets) or LDS-6B (6" brackets).



**Figure 9.** Two bracket sizes available.

When mounting 3M brackets to guardrails and LDS panels to brackets, 3M recommends the use of 3M™ Windo-Weld™ Super Fast Urethane (#08609).<sup>1</sup> Windo-Weld is stocked at most local general automotive supply stores, is available in standard caulking tubes, and should be applied to brackets and panels using a construction style caulking gun. Windo-Weld must be applied only under dry weather conditions and at a temperature of no less than 60 °F. One tube of Windo-Weld will adhere 10 LDS panels and 30 LDS brackets, either 4" or 6" wide (see Figure 10).

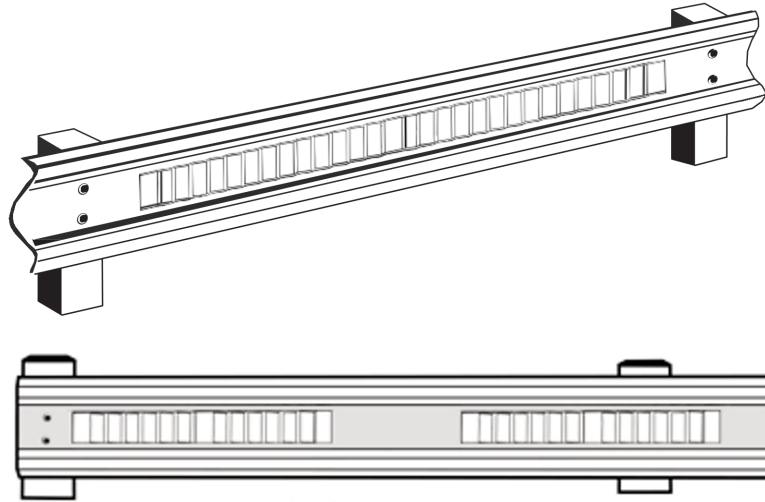


**Figure 10.** Applying 3M Windo-Weld Super Fast Urethane to 3M bracket.

1. Other epoxy and adhesive systems can be used to mount brackets and LDS panels to guardrails. However, the end user is responsible for testing the durability and strength of any other epoxy system and determining its suitability.

**Note:** To ensure proper adhesion, apply Windo-Weld caulk only to dry guardrails and allowed it to dry for at least 8 hours in the absence of rain. Prior to installation with Windo-Weld, verify that no rain is forecast to fall for at least 8 hours.

Finished LDS panels provide continuous linear delineation when are installed edge to edge and intermittent linear delineation when spaced 18” apart along a guardrail, as shown in Figure 11.



**Figure 11.** LDS panels provide continuous linear delineation when installed edge to edge (top) and intermittent linear delineation when spaced 18” apart (bottom).

**Note:** For LDS mechanical guardrail mounting brackets, please call WSIH/Irwin-Hodson Company at 1-877-641-3021.

## 6 Health and Safety Information

Read all health hazard, precautionary, and first aid statements found in the Safety Data Sheets (SDS) and Article Information Sheets for important health, safety, and environmental information. Consult federal, state, and local air quality regulations that may regulate or restrict product use, including those governing volatile organic compound (VOC) content and/or emissions. This product is manufactured without the use of heavy metals, lead chromate pigments, or other similar lead containing chemicals. To obtain SDSs and Article Information Sheets for 3M products, go to [3M.com/SDS](http://3M.com/SDS), contact 3M by mail, or for urgent requests call 1-800-364-3577.

## 7 Warranty Information

### 7.1 3M Warranty

3M Linear Delineation System Series 340 (“Product”) is warranted (“Basic Warranty”) to be free of defects in materials and manufacture at the time of shipment and to meet the specifications stated in this product bulletin. If the Product is proven not to have met the Basic Warranty on its shipment date, then a buyer’s exclusive remedy, and 3M’s sole obligation, at 3M’s option, will be refund or replacement of the Product.

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## 8 Other Product Information

Always confirm that you have the most current version of the applicable product bulletin, information folder, or other product information from 3M's Website at <http://www.3M.com/roadsafety>.

## 9 Literature References

[3M Data Sheet 5962](#)      3M™ VHB™ Acrylic Foam Tape 5962 Product Data Sheet  
[3M Technical Bulletin VHB](#)      Surface Preparation for 3M™ VHB™ Tape Applications  
[3M™ Hi-Strength 90 Spray Adhesive - Low VOC<25%](#)

## For Information or Assistance

Call: 1-800-553-1380

In Canada Call:

1-800-3M HELPS (1-800-364-3577)

## Internet:

<http://www.3M.com/roadsafety>

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