Flexible Prismatic Conspicuity Markings
Series 963

Product Bulletin 963  October 2014

Description
3M™ Flexible Prismatic Conspicuity Markings Series 963 are highly retroreflective flexible microprismatic markings designed to mark the sides and rear of vehicles for enhanced visibility and detection. The reflective marking consists of prismatic lenses that are formed in a transparent, synthetic resin, reflectorized and backed with a pressure sensitive adhesive and paper liner. Series 963 meets or exceed all FMVSS 108 requirements.

Features
• 2, 3, and 4 inch wide x 50 yard rolls
• High brightness
• Wide angularity
• 5 year warranty

Easy to apply
• Aggressive pressure sensitive adhesive
• Easy to remove liner
• Available in convenient rolls or kiss-cut pieces on a roll

<table>
<thead>
<tr>
<th>Product Code</th>
<th>Color</th>
<th>Size</th>
<th>DOT Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>963-10</td>
<td>White</td>
<td>2, 3, 4 inch x 50 yards</td>
<td>Yes</td>
</tr>
<tr>
<td>963-32</td>
<td>Red 11 inch/White 7 inch (alternating pattern)</td>
<td>2, 3, 4 inch x 50 yards</td>
<td>Yes</td>
</tr>
<tr>
<td>963-326</td>
<td>Red 6 inch/White 6 inch (alternating pattern)</td>
<td>2 inch x 50 yards</td>
<td>Yes</td>
</tr>
<tr>
<td>963-72</td>
<td>Red</td>
<td>2, 3, 4 inch x 50 yards</td>
<td>Yes</td>
</tr>
</tbody>
</table>
The minimum coefficient of retroreflection values of these sheetings when new are given in Table A in terms of candelas per lux per square meter. Measurements are made for samples applied to an aluminum panel in accordance with ASTM E-810 “Standard Test Method for Coefficient of Retroreflective Sheeting” and represent an average of values at 0 and 90 degree orientations.

### Table A. Minimum Coefficient of Retroreflection (R_a) for New Sheeting (cd/lux/m²)

<table>
<thead>
<tr>
<th>Observation Angle</th>
<th>Entrance Angle</th>
<th>0.2º</th>
<th>0.5º</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-4º</td>
<td>30º</td>
<td>45º</td>
</tr>
<tr>
<td>963 White</td>
<td>250</td>
<td>250</td>
<td>60</td>
</tr>
<tr>
<td>963 Red</td>
<td>60</td>
<td>60</td>
<td>15</td>
</tr>
</tbody>
</table>

1 Observation Angle – the angle formed by the light beam striking the reflective surface and the light beam returning to the observer

2 Entrance Angle – the angle formed by a light beam striking a surface at a point and a line perpendicular to the surface at the same point.

The following technical information should be considered typical only and should not be used for specification purposes.

### Table B. Physical Properties for New Sheeting

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thickness</td>
<td>0.010 inch – 0.014 inch (.25 – .36mm)</td>
</tr>
<tr>
<td>Gloss</td>
<td>100</td>
</tr>
<tr>
<td>Whitenss</td>
<td>&gt; 15 white, &gt; 2.5 red</td>
</tr>
<tr>
<td>Dimensional Stability</td>
<td>&lt; 0.125 inch change on 9 x 9 panel</td>
</tr>
<tr>
<td>Flexibility</td>
<td>No cracking</td>
</tr>
<tr>
<td>High Pressure Wash Test</td>
<td>No delamination from panel</td>
</tr>
<tr>
<td>Adhesion 90º Hanging Weight</td>
<td>&lt; 2 inch (55mm) movement</td>
</tr>
<tr>
<td>Minimum Application Temperature</td>
<td>50ºF (10ºC)</td>
</tr>
<tr>
<td>Instron Peel Adhesion</td>
<td>3.0 lbs./inch or greater on typical substrates</td>
</tr>
<tr>
<td>Chemical Resistance</td>
<td>Not affected by toluene, #2 diesel fuel, gasoline, kerosene, TSP detergent, xylene, dilute metal brighteners</td>
</tr>
<tr>
<td>Corrosion Resistance</td>
<td>No effect in 1000 hours</td>
</tr>
<tr>
<td>Impact Resistance</td>
<td>No damage outside impact area</td>
</tr>
<tr>
<td>Room Temperature</td>
<td>No damage outside impact area</td>
</tr>
</tbody>
</table>
### Maintenance

**Cleaning**

Routine washing is recommended for maximum performance. The following cleaning methods are recommended:

- Wash with sponge, cloth or soft brush using water and detergent.
- Standard high-pressure hand spray:
  - **Maximum** pressure – 1200 PSI/80 bar.
  - **Maximum** water/wash solution temperature – 140°F/60°C.
  - **Minimum** of 12 inches/30 cm distance between spray tips and markings.

Cleaning wand or spray tips to be at no greater angle than 45 degrees from perpendicular to the marking’s surface.

Use Spray Tip – #1505 (15 deg spray angle, 05 capacity size).

- When using metal brighteners, follow manufacturer’s recommendations for dilution. Thoroughly rinse from marking after soaking vehicle.

**Storage**

Routine washing is recommended for maximum performance. The following cleaning methods are recommended:

- Store in a cool, dry area out of direct sunlight.
- Temperature 65-75°F (18-24°C)
- Humidity 30-50%
- Store rolls horizontally, in carton or in original packaging.

### Shelf Life

Apply series 963 markings within two years of receipt of material.

### Health and Safety Information

Read all health hazard, precautionary, and first aid statements found in the Material Safety Data Sheet and/or product label of chemicals prior to handling or use.

### General Performance Considerations

Series 963 markings will provide maximum durability when:

- 3M recommended procedures are followed.
- Markings are applied to vertical surfaces (within +20°).

Actual durability will be based on actual customer use conditions. Durability can be reduced if recommended techniques are not followed, including:

- Improper application or surface preparation.
- Failure to cut markings around rivets, seams and body panels.
- Improper use of high pressure cleaning.
- Spillage of chemicals or solvents.

### Warranty

3M warrants that 3M™ Flexible Prismatic Conspicuity Markings Series 963 sold by 3M to be used for markings in the United States and Canada will remain effective for the intended use and meet the stated minimum values for coefficient of retroreflection for 5 years when applied on vertical (+20°) surfaces. If the 3M reflective marking is applied in accordance with all 3M application and fabrication procedures, including the exclusive use of 3M recommended application equipment; and if the emblem or marking deteriorates due to natural causes, such as fading, cracking, peeling, lifting, or discoloration; 3M’s sole responsibility and purchaser’s exclusive remedy shall be that 3M will provide replacement of the 3M material.
Warranty (continued)

Conditions

Such failures must be solely the result of design or manufacturing defects in the 3M reflective markings and not of outside causes such as: improper handling, maintenance or installation; use of application procedures not recommended by 3M; failure of substrate; exposure to chemicals, abrasion and other mechanical damage from fasteners used to mount the marking; collisions, vandalism or malicious mischief.

3M reserves the right to determine the method of replacement.

Replacement markings will carry the unexpired warranty of the markings they replace.

Claims made under this warranty will be honored only if 3M is notified of a failure within a reasonable time, reasonable information requested by 3M is provided, and 3M is permitted to verify the cause of the failure.

Limitation of Liability

3M’s liability under this warranty is limited to replacement as stated herein, and 3M assumes no liability for any incidental or consequential damages, such as lost profits, business or revenues in any way related to the product regardless of the legal theory on which the claim is based. THIS WARRANTY IS MADE IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY, OF FITNESS FOR A PARTICULAR PURPOSE, AND ANY IMPLIED WARRANTY ARISING OUT OF A COURSE OF DEALING OR OF PERFORMANCE, CUSTOM OR USAGE OF TRADE.

Literature Reference

Information Folder 4.9 Application Instructions for 3M™ Diamond Grade™ and 3M™ Flexible Prismatic Conspicuity Markings
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