

Traffic Safety and Security Division

Conspicuity Markings

Series 943

Product Bulletin 943

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Description

3M™ Conspicuity Markings Series 943 are highly retroreflective flexible microprismatic markings designed to mark the front, 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 943 meets or exceeds all ECE Regulation 104 revision 1 (including Amendment 1, supplement 7) requirements.

Features

- High brightness
- Excellent angularity in both horizontal and vertical orientations
- Up to 5 years external durability

Easy to apply

- Aggressive pressure sensitive adhesive
- Easy to remove liner

Product Identification

Product Code	Color	Sizes Available
943-10	White	50.8 mm x 50 m
943-71	Yellow	50.8 mm x 50 m
943-72	Red	50.8 mm x 50 m

Coefficient of Retroreflection

The minimum coefficient of retroreflection values of these markings when new are given in Tables 1 & 2 in terms of candelas per lux per square meter. Measurements are made for samples applied to an aluminum panel in accordance with CIE Publication No. 54, 1982.

Table 1

Minimum values for the Coefficient of Retroreflection R' (cd.m ⁻² .lx ⁻¹)					
Observation Angle α (°)	Entrance Angle β (°)				
$\alpha = 0.33^\circ (20')$	$\beta 1$	0	0	0	0
	$\beta 2$	5	30	40	60
Color					
Yellow		300	130	75	10
White		450	200	95	16

Table 2

Minimum values for the Coefficient of Retroreflection R' (cd.m ⁻² .lx ⁻¹)					
Observation Angle α (°)	Entrance Angle β (°)				
$\alpha = 0.33^\circ (20')$	$\beta 1$	0	0	0	0
	$\beta 2$	5	20	30	40
Color					
Red		120	60	30	10

Color

When illuminated by the CIE Standard Illuminant A at an entrance angle $\beta 1 = \beta 2 = 0^\circ$ See Nighttime reflected colors listed in Table 3 below.

Table 3 – CIE Chromaticity Coordinates Limits

Chromaticity Coordinates					
Color		1	2	3	4
Yellow	x	0.585	0.61	0.52	0.505
	y	0.385	0.39	0.48	0.465
White	x	0.373	0.417	0.45	0.548
	y	0.402	0.359	0.513	0.414
Red	x	0.72	0.735	0.665	0.643
	y	0.258	0.265	0.335	0.335

Physical Properties

3M™ Conspicuity Markings Series 943 shall meet ECE Regulation 104 revision 1 (including Amendment 1, supplement 7). The following technical information should be considered typical only and should not be used for specification purposes. Properties are listed in Table 4.

Table 4 - Physical Properties for New Sheeting

Property/Test Method	
Bonding Strength ECE-104 Section 8 90 Degree Peel	Sample shall require a force of 10 N per 25 mm width to be removed at a rate of 300 mm/minute.
Resistance to Corrosion ECE-104 Section 2.1 Saline Mist Exposure	Retroreflection not less than the values in Table 1 and Table 2 at the .33° observation and 5° entrance angle. Will show no sign of corrosion liable to impair the efficiency of the marking.
Resistance to Fuels ECE-104 Section 3	Sample will show no visible change which would reduce its effective performance.
Resistance to Heat ECE-104 Section 4	Sample will show no cracking or appreciable distortion of the surface particularly of the optical units.
Resistance to Penetration of Water ECE-104 Section 7	After exposure, no water should penetrate the reflecting surface. When in doubt of water being present, retro-reflection must meet the values in Table 1 and Table 2.
Resistance to Power Washing ECE-104 Section 5.2	The sample shall show no damage to the retro-reflective surface or delamination from the substrate or separate from the sample mounting surface.
Flexing/Bending ECE-104 Section 9.	The sample shall have no cracking of the surface and not show any visible change that would reduce its effective performance.

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/30cm 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

- 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 943 markings within one year of receipt of material.

Health and Safety Information

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

General Performance Considerations

Series 943 markings will provide maximum durability when:

- 3M recommended procedures are followed.
- Markings are applied to vertical surfaces (within $\pm 10^\circ$).

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 943 sold by 3M to be used for truck and trailer conspicuity markings will remain effective for the intended use for 5 years when applied on vertical ($\pm 10^\circ$) surfaces subject to the following provisions:

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.

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.

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Literature Reference

Information Folder 4.20

Flexible Prismatic Conspicuity Markings Series 933 and Prismatic Conspicuity Markings Series 943
Application Instructions for Trucks, Trailers and Specialty Vehicles

**For Information or Assistance
Call: 1-800-553-1380**

**Internet:
www.3M.com/roadwaysafety**

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.

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