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Transportation Safety Division

3M™ Diamond Grade™ and Flexible Prismatic Conspicuity Markings

Application Instructions for Trucks, Trailers, and Specialty Vehicles

Information Folder 4.9
April 2018

Replaces Information Folder 4.9 Dated May 2017

1 Description

3M Diamond Grade Conspicuity Markings Series 983, 3M Diamond Grade™ Flexible Prismatic Conspicuity Markings Series 973, and 3M™ Flexible Prismatic Conspicuity Markings Series 963 utilize a pressure sensitive adhesive for application to many clean, dry, weather-resistant surfaces.

The adhesive is protected by an easy-release liner. 3M conspicuity markings are intended to be applied to the sides and rear perimeters of vehicles in continuous stripes to enhance visibility and recognition by motorists. See examples later in this information folder.

Markings can be applied to flat surfaces (drilled or punched to accommodate rivets) and non-compound curved surfaces with radii greater than five inches. For applications on corrugated vehicles, apply markings to bottom and top rails, or between corrugations if adequate flat surface is available.

3M recommends against application over bolts, rivets, support plates, corrugations, exterior posts, weld joints, the ends of vehicle surfaces, irregularly shaped frameworks, rusted or corroded metal, loose or chalking paint, within ⅛ inch of door hinges, or within three inches of mandated lights, reflectors, or turn signals.

2 Storage

Diamond Grade conspicuity markings can be stored for a period of two years in a cool, dry area at temperatures of 65-75°F (16-24°C) and must be applied within the two years of date of manufacture. Rolls should be stored horizontally or in their shipping cartons. Partially used rolls should be returned to the shipping cartons or suspended horizontally from rods or pipes through their cores.

3 Application Instructions

3.1 Required Tools

1 3M Blue Squeegee PA-1-B or 3M Gold Squeegee PA-1-G.

2 Monkey Strip, applied to the edge of the squeegee.

3 Utility knife and scissors; available locally at hardware or industrial supply stores.

4 Osborne Arch Punch No. 149 or Osborne Belt Punch No. 245 of proper size; available at hardware or industrial supply stores.

5 3M Scotch-Brite™ Heavy Duty Cleaning Pad (green or brown); available locally at paint or industrial supply stores.

6 Lint free paper towels.

7 Recommended cleaning solvent (see “Surface Preparation” below).

4 Temperature and Environment

For optimum adhesion and durability, 3M conspicuity markings should be applied when air and application surface temperatures are within the following limits:

- Minimum - 50°F (10°C)
- Maximum - 100°F (38°C)

3M conspicuity markings may also be applied when air and application surface temperatures are beyond these limits if the following precautions are taken:

- Above 100°F (38°C) care must be taken to avoid pre-adhesion.
- Below 50°F (10°C) the substrate surface may be heated to a temperature within the application range using portable heaters or heat lamps. When air temperature is below the minimum application temperature, markings should be stored in a hotbox to keep them above 50°F (10°C) until application.

5 Surface Preparation

All surfaces must be cleaned prior to application.

1 Wash surfaces with detergent and water to remove dirt and road film.

2 Solvent wipe using lint-free paper towel saturated with non-oily, quick-drying solvent, such as isopropyl alcohol, acetone, or 3M Prep Solvent 70.

3 Immediately dry surfaces with clean, dry, lint-free paper towel before solvent evaporates completely, paying close attention to rivets, seams, and door hinge areas.

Note: An application surface that has been washed, dried, and solvent wiped can still have poor adhesion in the areas around rivets and seams due to liquid retention caused by capillary action.

For stainless steel applications, initial adhesion is improved by wiping with distilled vinegar and drying after solvent cleaning has been completed.

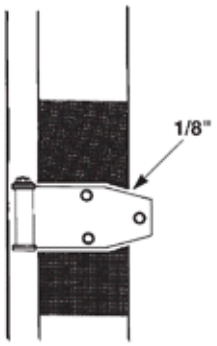
6 Application Procedure

These procedures should be followed when applying markings to cleaned surfaces within the proper application temperature range.

1 Markings must be cut to allow three inches of clearance around required lights and reflectors, and ⅛ inch of clearance around exterior posts, tie down posts, and large bolts and rivets when applied to frame rails.

On corrugated trailers, apply markings to frame rails if a flat surface is not available and cut around rivets as recommended below.

Apply markings no closer than ⅛ inch from door hinges, door hardware, ends of trailers, and weld joints, as illustrated in Figure 1, to avoid wrinkling and lifting. Cut markings back ⅛ inch on lower panels of tank trailer expansion joints.

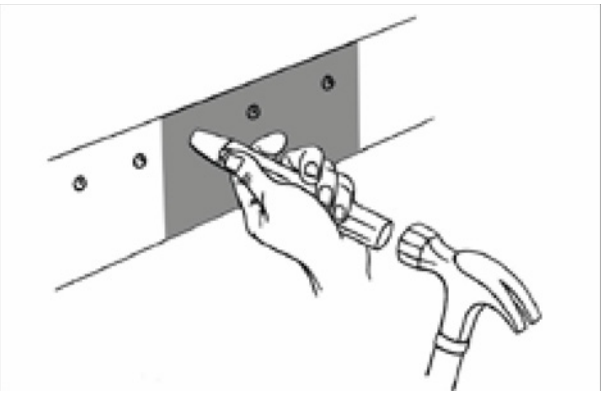


2 Remove the liner from the back of the marking, position and align the marking on the vehicle, and tack it down lightly to hold it in position. For Flexible Prismatic Conspicuity Markings Series 963 and 973, care should be taken to avoid stretching markings.

3 Using a PA-1 applicator, press the marking to the surface using firm, vertical, overlapping strokes. Be sure all edges are well adhered by re-squeegeeing them.

4 Apply the remaining markings using the above procedures.

5 Apply markings over rivets using firm pressure, leaving bridges over rivet heads. Cut markings around rivets using Osborne punches of proper sizes to fit over rivets. To cut a marking around a rivet, place the tool over the top of the rivet and tap lightly using a small hammer while slightly turning the cutting tool. Remove the cut film from the rivet head. Squeegee the marking around the rivet with firm pressure. Avoid applying markings over closely spaced rivets where possible. Apply markings above the bottom row of closely spaced rivets on side panels.



6 Cut markings at all panel seams and door openings using a sharp utility knife, then squeegee the markings to the surface. Cut markings so they are no closer than ⅛ inch from exterior post weld joints, door hinges, door hardware, lower panels of expansion joints on tank trailers, and ends of trailers to avoid lifting and wrinkling.

7 **Markings should not be overlapped to make seams or joints**. Rather, markings should be butted together.

8 Do not apply markings beyond panel edges, where moisture and dirt can contaminate the adhesive.

7 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) between cleaning spray tip and marking.
  Cleaning wands and spray tips are to be used at angles no greater than 45 degrees from perpendicular to marking surfaces.
  Use Spray Tip #1505 (15 degree spray angle, 05 capacity size).

- When using metal brighteners, follow manufacturers' recommendations for dilutions. Thoroughly rinse brighteners from markings after soaking rail cars or other vehicles.

8 Removal Instructions

8.1 Required Tools

1 Single edged razor blades.

2 Handled tool to hold razor blades.

3 Safety glasses.

4 Solvent resistant protective gloves.

5 Absorbent paper towels.

8.2 Recommended Solvents:

1 Isopropyl alcohol (rubbing alcohol).

2 On of the following adhesive removal products:

- a 3M Citrus Cleaner.
- b Brake cleaning fluid.
- c Paint remover in aerosol can – use ONLY on bare metals (non-painted).
- d Other products may be used to de-tackify the adhesive but take care not to use products that will harm the finish of the application surface.

NOTE: Always follow manufacturers' instructions and safety recommendations.

8.3 Marking Removal

1 Use handled tool containing a new single edged razor blade to lift an edge of the marking.

2 While keeping the edge of the razor close to the surface of the substrate, begin to work the razor from side-to-side in small strokes in the direction of removal.

3 Pull the loose marking with minimal tension from the substrate at an angle of approximately 45 degrees while working the razor back and forth.

4 If markings break away from the substrate, keep repeating steps one through three above.

5 It is very important to change razor blades frequently. A sharp blade will give best results.

Note: Ease of marking removal will depend on initial adhesion and time on substrate.

8.4 Adhesive Removal

1 Spray one of the suggested adhesive removal products (Section 8.2) onto the adhesive residue.

2 Let the remover soak on the adhesive for three to five minutes.

3 Use a sharp razor blade in a handled tool to scrape off adhesive.

4 Wipe residue off razor onto paper towel.

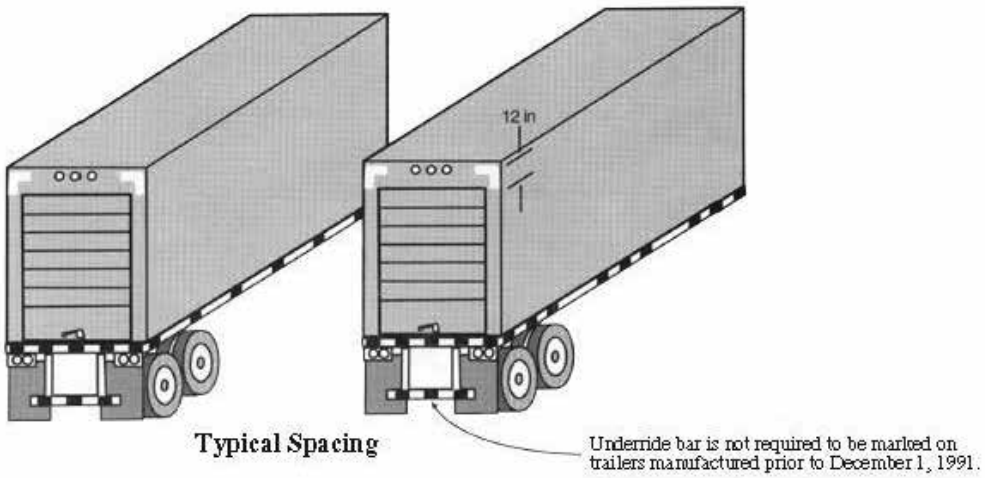
5 It may be necessary to repeat steps one through four several times to remove all adhesive.

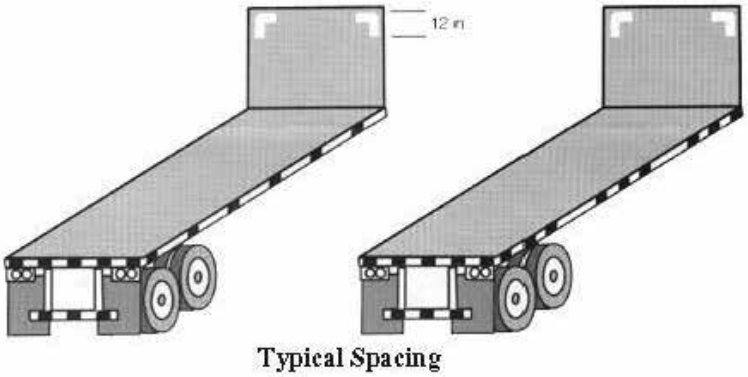
6 Always use a sharp razor blade for best results.

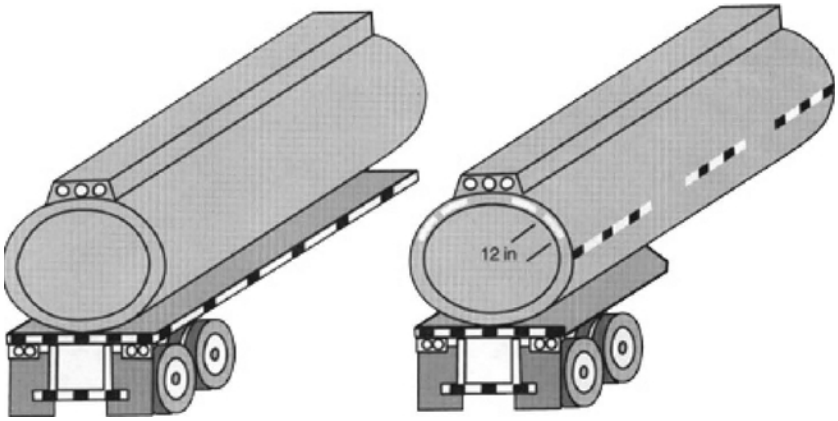
7 All adhesive residue must be removed before reapplying markings.

8 Substrate must be cleaned with alcohol using one towel to clean and another to wipe away residue before reapplying markings.

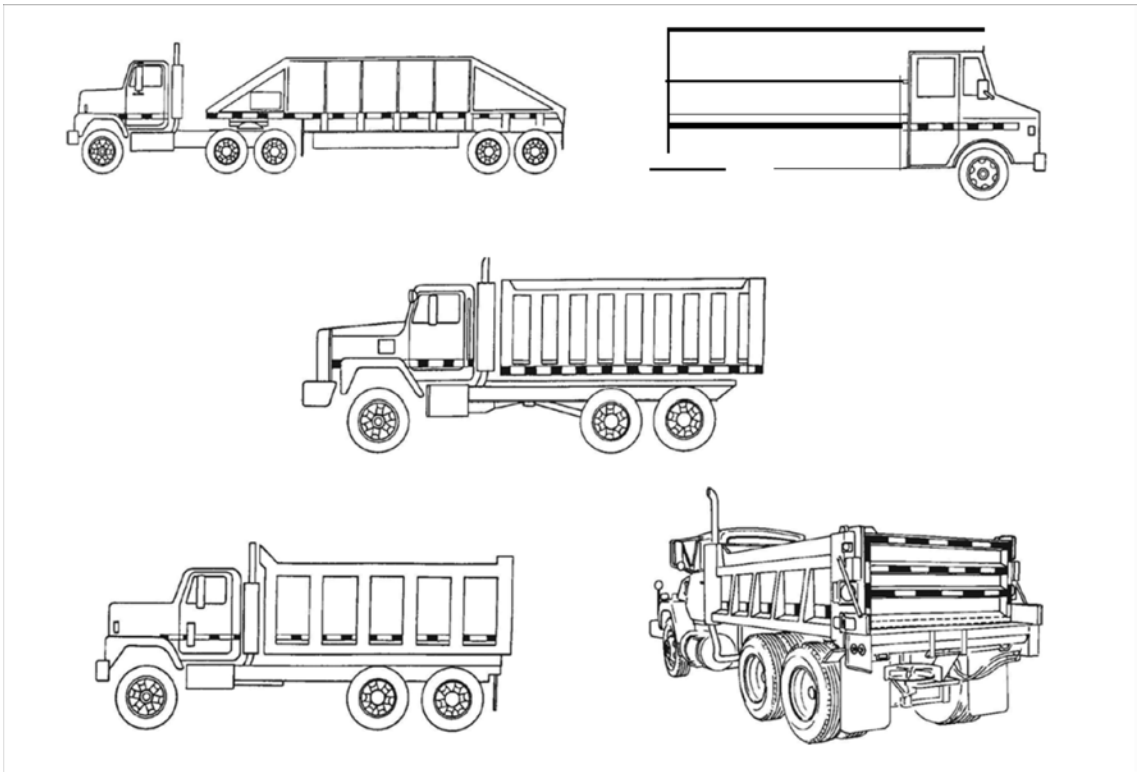
Truck and Trailer Application Guidelines for Conspicuity Markings Series 983/973/963







Typical Spacing



Suggested Applications

9 Health and Safety Information

Read all health hazard, precautionary, and first aid statements found in the Safety Data Sheet (SDS), Article Information Sheet, and/or product labels of chemicals prior to handling or use. Consult local regulations and authorities for possible restrictions.

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3M™ Diamond Grade™ Conspicuity Markings Series 983

Product Bulletin Series 983
April 2018

Replaces Product Bulletin 983 Dated April 2017

1 Description

3M Diamond Grade Conspicuity Markings Series 983 are highly retroreflective microprismatic markings designed to enhance the visibilities of the sides and rears of vehicles. These reflective markings consist of prismatic lenses that are formed in a transparent, synthetic resin, and sealed and backed with a pressure sensitive adhesive and clear polymeric liner. Diamond Grade Conspicuity Markings are highly durable, providing up to ten years of field performance. 3M's Series 983 markings have excellent angularity which provides enhanced visibility for drivers.

For warranty and product information on specific applications, such as trucks and trailers, rail cars, school buses, or emergency vehicles, please see the specific product bulletins. This product bulletin applies to applications other than trucks and trailers, rail cars, school buses, or emergency vehicles.

- Combined fluorescence and retroreflection provides 24-hour visibility and detection.
- Fluorescence enhances visibility.

For details of the features and benefits of Series 983 sheeting, please refer to the 3M Transportation Safety Division website.

Conspicuity Markings Series 983 is available in the following colors.

Table 1. Product Codes by Color

Color	Product Code
White	983-10
Yellow	983-71
Red	983-72
Fluorescent Yellow	983-21
Fluorescent Yellow-Green	983-23

1.1 Easy to Apply

- Aggressive pressure sensitive adhesive
- Easy to remove liner
- Available in rolls, packaged pieces, or kiss-cut pieces on a roll. Please refer to the 3M Transportation Safety Division Pricing Catalog for the standard product offering.

1.2 Durable

- Pre-sealed edges
- Non-metallic construction

2 Typical Physical Properties

Table 2 presents typical physical property data for Series 983 Conspicuity Markings. The information presented in Table 2 should be considered typical only, and not be used for specification purposes.

Table 2. Typical Physical Properties

Property	Series 983 Typical Values
Thickness (Caliper)	0.014 inch - 0.018 inch
Whiteness Daytime Luminance Limit YT ASTM E1164	45 White 5 Red 27 Yellow 75 Fluorescent Yellow 90 Fluorescent Yellow-Green
Gloss ASTM D523 at 85°	100
Shrinkage ASTM D4956	No substantial change
Flexibility - wrap around 0.125 inch mandrel at 32° F (0° C)	No cracking
High pressure wash test - 45° angle, 1200 psi, 8 inch away	Passes
Adhesion - 90° Hanging Weight ASTM D4956	0.2 inch (4 mm)
Minimum Application Temp.	50° F (10° C)
Instron Peel Adhesion 12 inch/minute, 90° pullback	Degreased aluminum 5.3 lb/in (.95 kg/cm) Prepainted panel 3.0 lb/in (0.55 kg/cm) Stainless steel 6.0 lb/in (1.1 kg/cm) FRP 2.5 lb/in (0.52 kg/cm) Tedlar® 3.0 lb/in (0.54 kg/cm) Aluminum Rail 3.5 lb/in (0.56 kg/cm)
Chemical Resistance SAE J1967	Not affected by toluene, #2 diesel fuel, gasoline (leaded) kerosene, TSP detergent, xylene, dilute metal brighteners
Corrosion Resistance ASTM B117 Salt Spray	No effect - 1000 Hours
Room Temperature Impact Resistance 100 in-lb, 5/8 inch tip	No damage outside impact
Cold Temperature Impact Resistance 60 in-lb at -20° F	No damage outside impact

3 Coefficient of Retroreflection, R_A

The values in Table 3 are typical coefficients of retroreflection, expressed in candelas per lux per square meter (cd/lux/m^2). Conformance to coefficient of retroreflection requirements shall be determined instrumentally, in accordance with ASTM E810 “Test Method of Coefficient of Retroreflection of Retroreflective Sheeting.” Per ASTM E810, R_A values obtained at 0° and 90° rotations were averaged to determine the R_A values presented in Table 3.

Table 3. Typical Coefficient of Retroreflection (R_A) Values for New Sheeting (cd/lux/m^2)

Observation Angle[a]	Entrance Angle[b]	Typical R_A for White 983	Typical R_A for Red 983	Typical R_A for Yellow 983	Typical R_A for FL. Yellow 983	Typical R_A for FL. Yellow-Green 983
0.2°	-4°	800	160	645	400	700
	30°	430	110	420	220	430
	45°	175)	45	235	120	160
0.5°	-4°	460	95	360	150	385
	30°	215	40	180	75	180
	45°	55	15	65	40	30

a. Observation Angle - the angle between the illumination axis and the observation axis.
b. Entrance Angle - the angle between the illumination axis and the retroreflector axis. The retroreflector axis is an axis perpendicular to the retroreflective surface.

4 Typical Physical Characteristics

Table 4 describes the typical physical characteristics of Series 983. The information in Table 4 should be considered typical only, and not be used for specification purposes.

Table 4. Typical Physical Characteristics

Property	Description
Adhesive color and type	Clear, pressure sensitive
Liner	Translucent polymeric
Application surfaces	Painted or unpainted flat metal without rivets
Heat resistance	Maintains 70% of original coefficient of retroreflection at (α=0.2, β=-4) after 24 hr. exposure to 170° F (77° C) in air
Recommended minimum application temperature (ambient and substrate)	50° F (10° C)
Performance range	-30° F to 200° F (-34° C to +94° C)

5 Photometrics

5.1 Fluorescence

Fluorescent materials absorb short wavelength, invisible, incident radiation (solar energy) and re-emit it as longer wavelength, visible light. This re-emission of visible light continues as long as exciting incident radiation is present. This means fluorescent materials are especially effective during dawn, dusk, and overcast days. Fluorescence adds to the daytime luminances (apparent brightnesses) of markings and enhances the visibilities of emergency vehicles and other vehicles.

5.2 Color Test for Fluorescent Sheetings

Conformance to standard chromaticity (x, y) and luminance factor (Y) requirements shall be determined instrumentally, in accordance with ASTM E991, on sheeting applied to smooth aluminum test panels cut from alloy 6061-T6 or 5052-H38. Chromaticity values shall be determined on a HunterLab ColorFlex 45/0 spectrophotometer. Calculations shall be performed using CIE Illuminant D65 and the 2° standard observer.

Fluorescence luminance factors (Y_F) differentiate fluorescent markings from ordinary (nonfluorescent) markings. The additional daytime luminance provided by fluorescence is directly related to the increased conspicuity of fluorescent vehicle markings under the varying daylight illumination conditions encountered in outdoor safety marking applications. A marking's fluorescence luminance factor, Y_F, provides a standardized measure of the marking's fluorescence.

A marking's numerical Y_F value serves, under specified illumination and viewing conditions, to: 1) verify the fluorescence of the marking (for nonfluorescent markings Y_F=0) and 2) quantify the fluorescent efficiency of the marking. The magnitude of a marking's Y_F can be used to assess whether the fluorescence of the marking is sufficient for it to provide high daytime visibility performance under less than ideal conditions. Typical Y_F values for 983-21, fluorescent yellow, and 983-23, fluorescent yellow-green, are provided in Table 5.

Table 5. Typical Luminance Factor Values for 3M Diamond Grade 983-21 Fluorescent Yellow and 983-23 Fluorescent Yellow-Green Conspicuity Markings[a]

Color	Total Luminance Factor (Y_T)	Luminance Factor (Y_F)	Luminance Factor (Y_R)
Fluorescent Yellow	75	55	20
Fluorescent Yellow-Green	90	55	35

a. Total luminance is defined as the sum of fluorescent and reflected luminance ($Y_T=Y_F+Y_R$) and is determined in accordance with ASTM E2152 and ASTM E2153.

6 Maintenance

6.1 Cleaning

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

- Clean with sponge, cloth, or soft brush using water and detergent
- Automatic truck/car wash or standard high-pressure hand spray under following conditions:
  - Maximum pressure: 1200 PSI/80 bar
  - Maximum water/wash solution temperature: 140° F (60° C)
  - Minimum of 12 inches (30 cm) between cleaning jet(s) and marking
  - Cleaning wand or jets at angle of no more than 45 degrees from perpendicular to the marking surface
  - Use spray tip #1505 (15 degree spray angle, 05 capacity size)
- When using metal brighteners, follow manufacturer's recommendations for dilution. Thoroughly rinse brightener from markings after soaking vehicle

6.2 Storage

Series 983 markings should be stored in a cool, dry area, out of direct sunlight, at a temperature of 65-75° F (18-24° C) and a relative humidity of 30-50%. Rolls should be stored horizontally in their shipping cartons or original packaging.

6.3 Shelf Life

Apply Series 983 markings within two years of date of manufacture.

7 Durability

Series 983 markings will provide maximum durability when:

- All 3M recommended procedures are followed and
- Markings are applied to vertical surfaces (within ± 20° of vertical orientation).

Series 983 marking durability depends on use. Failure to follow 3M-required techniques may reduce durability.

Below are some conditions and processing examples that may lead to reduced durability:

- Failure to cut markings around rivets, seams, and body panels
- Improper use of high pressure cleaning
- Contact with non-recommended chemicals or solvents
- Improper application or surface preparation
- Horizontal exposure
- Open cells along the edges of a marking may collect dirt, which will not reduce marking performance
- Damage due to external conditions may reduce adhesion and reflectivity near the damaged area

8 Health and Safety Information

Read all health hazard, precautionary, and first aid statements found in the Safety Data Sheet (SDS), Article Information Sheet, and/or product labels of chemicals prior to handling or use. Consult local regulations and authorities for possible restrictions.

9 Warranty Information

9.1 3M Basic Product Warranty

3M Diamond Grade Conspicuity Marking Series 983 (“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 a refund or replacement of the Product.

9.2 Additional Warranty

For additional warranty information on specific applications such as trucks and trailers, rail cars, school buses or emergency vehicles, please see the specific product bulletins for those applications.

9.3 Terms and Conditions

- Product must be processed and applied to a vertically-mounted (±20°) 3M recommended substrate as described in this product bulletin and in accordance with all 3M application, fabrication, and cleaning procedures provided in 3M's product bulletins, information folders, and applicable technical memos (which will be furnished to the manufacturer upon request).
- Any third-party imaging or altering of the Product not endorsed by 3M will void the 3M Warranty.
- A Product's failure to meet the 3M Warranty must be solely the result of design or manufacturing defects in the Product and not of (a) outside causes including improper storage, fabrication, handling, maintenance, or installation; (b) use of process colors, thinners, coatings, or other chemicals not recommended by 3M; (c) use of application procedures not recommended by 3M; (d) exposure to chemicals or solvents not recommended by 3M; (e) abrasion and other physical damage; (f) snow or any other burial of the marking; (g) collisions, vandalism, or malicious mischief; or (h) an act of God.
- 3M reserves the right to determine the method of replacement. Replacement product will carry the unexpired warranty of the Product it replaces.
- Claims made under this warranty will be honored only if 3M is presented with a traceable record of the Product's Installation Date, 3M is notified of a potential failure within thirty days of discovery, reasonable information requested by 3M is provided, and 3M is permitted to verify the cause of the failure.

9.4 Exclusive Limited Remedy and Disclaimer

If the Product is proven not to have met the 3M Warranty during the Warranty Period, then the purchaser's and user's exclusive remedy, and 3M's sole obligation, at 3M's option, shall be that 3M will provide replacement of the Product.

THE 3M WARRANTY IS MADE IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OR CONDITION OF MERCHANTABILITY, OR FITNESS FOR A PARTICULAR PURPOSE, OR ANY IMPLIED WARRANTY ARISING OUT OF A COURSE OF DEALING OR OF PERFORMANCE, CUSTOM, OR USAGE OF TRADE.

9.5 Limitation of Liability

Except for the limited remedy stated above, and except where prohibited by law, 3M will not be liable for any loss or damage arising from any 3M product, whether direct, indirect, special, incidental, or consequential damages (including but not limited to lost profits, business, or revenue in any way), regardless of the legal theory asserted including warranty, contract, negligence, or strict liability.

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3M™ Diamond Grade™ Reflectors Series 989

Product Bulletin Series 989
June 2019

Replaces Product Bulletin 989 Dated December 2018

1 Description

3M Diamond Grade Reflectors Series 989 (“Reflectors”) features highly retroreflective prismatic lenses in a durable transparent synthetic resin that is backed with an aggressive pressure sensitive adhesive and clear polymer liner. Reflectors are available in vivid red and amber, providing bright and reflective demarcation.

- 2” x 3.5” rectangular reflectors are available on rolls, 500 reflectors per roll.
- 3” diameter round reflectors available in packages of 50.

Reflectors are available in the following colors.

Table 1. Product codes by color.

Color	Product Code
Red	989-72
Amber	989-74

2 Application

Reflectors must be applied to clean, dry surfaces applying pressure with a plastic squeegee. Per Federal Motor Vehicle Safety Standard 108 (“FMVSS 108”) and Canada Motor Vehicle Safety Standard 108 (“CMVSS 108”), red Reflectors are to be applied only to rear-facing surfaces and back corners of trailers, and amber Reflectors are to be applied only to side and front-facing surfaces of trailers.

3 Product Features

Table 2 describes the features of Reflectors.

Table 2. Reflector features.

Feature	Description
Low Profile	Reflectors are not easily knocked off and continue to function when damaged
Adhesive type	Pressure sensitive
Easy to apply	Apply using pressure; no drilling or mechanical fasteners required
Liner	Clear polymeric
Application substrates	Aluminum, stainless steel, fiberglass reinforced plastic, painted surfaces, and painted/sealed wood
Application temperature range	50 to 100 °F (10 to 38 °C)
Retroreflectivity standards	Meet photometric requirements of FMVSS 108 and SAE J594 for Reflex Reflectors when mounted in the 0° orientation. Excellent angularity - beyond 60°
Warranty period	7 years

4 Retroreflection

When mounted to the substrate in the 0° orientation, Reflectors comply to the FMVSS 108 and SAE J594 photometric requirements for red and amber reflex reflectors presented in Table 3.

Table 3. Minimum retroreflection values, R_I, for new Reflectors in the 0° orientation, as defined by FMVSS 108 and SAE J594.

		Minimum for Red 989-72		Minimum for Amber 989-74	
Observation Angle[a]	**Entrance Angle[b]**	**(Cd/incident ft·c)**	**(mcd/lux)**	**(Cd/incident ft·c)**	**(mcd/lux)**
0.2°	0°	4.5	420	11.25	1050
	10° Up	3.0	280	7.5	700
	10° Down	3.0	280	7.5	700
	20° Left	1.5	140	3.75	350
	20° Right	1.5	140	3.75	350
1.5°	0°	0.07	6	0.175	15
	10° Up	0.05	5	0.125	12.5
	10° Down	0.05	5	0.125	12.5
	20° Left	0.03	3	0.075	7.5
	20° Right	0.03	3	0.075	7.5

a. Observation Angle - the angle between the illumination axis and the observation axis.
b. Entrance Angle - the angle between the illumination axis and the retroreflector axis. The retroreflector axis is an axis perpendicular to the retroreflective surface.

4.1 Entrance Angularity Performance and Orientation

Reflectors have been designed to be effective regardless of orientation on the substrate. However, because the efficiency of light return from cube corner reflectors is not equal at all application orientations, compliance to the photometric requirements of FMVSS 108 and SAE J594 requires that Reflectors be positioned at the 0° orientation. When the flat side of the diamond (direction of diamond chain links) is vertical, a reflector is said to be at a 0° orientation. See Figure 1 for details.

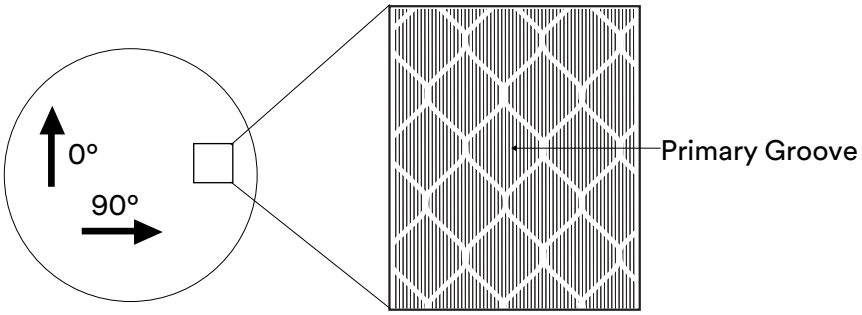

Figure 1. Primary groove line.

If FMVSS 108 and SAE J594 compliance is not required for a specific installation, Reflectors can be installed in any orientation.

5 Durability

Reflectors achieve maximum durability when:

- 3M recommended procedures are followed and
- Reflectors are applied to vertical surfaces.

Actual durability is dependent on use, and can be evaluated through field testing, exterior exposed testing, and artificial weathering testing. The following have been found to significantly diminish Reflector durability:

- Improper high pressure cleaning
- Exposure to solvents or other harsh chemicals
- Improper application, including improper surface preparation

6 Storage

Reflectors should be stored in a cool, dry area, preferably at 65-75 °F (18-24 °C) and 30-50% relative humidity, and applied within two years of date of manufacture.

7 Health and Safety Information

Read all health hazard, precautionary, and first aid statements found in the Safety Data Sheet (SDS), Article Information Sheet, and/or product labels of chemicals prior to handling or use. Consult local regulations and authorities for possible restrictions.

8 Warranty Information

8.1 3M Warranty

Reflectors sold by 3M for use on trucks, trailers and other vehicles in the United States and Canada will remain effective for their intended use by resisting fading, cracking, peeling, lifting, and or discoloration, for a period of seven (7) years (“Warranty Period”), as measured from the date of original installation (“Installation Date”).

8.2 Terms and Conditions

- Reflectors must be processed and applied to a vertically-mounted (±20°) 3M recommended substrate as described in this product bulletin and in accordance with all 3M application, fabrication, and cleaning procedures provided in 3M's product bulletins, information folders, and applicable technical memos (which will be furnished to the manufacturer upon request).
- Any third-party imaging or altering of Reflectors not endorsed by 3M will void the 3M Warranty.
- A Reflector's failure to meet the 3M Warranty must be solely the result of design or manufacturing defects in the Reflector and not of (a) outside causes including improper storage, fabrication, handling, maintenance, or installation; (b) failure of substrate; (c) use of application procedures not recommended by 3M; (d) exposure to chemicals or solvents not recommended by 3M; (e) abrasion and other physical damage, including damage from fasteners used to mount the Reflector; (f) collisions, vandalism, or malicious mischief; or (g) an act of God.
- 3M reserves the right to determine the method of replacement. Replacement product will carry the unexpired warranty of the Reflector it replaces.
- Claims made under this warranty will be honored only if 3M is presented with a traceable record of the Reflector's Installation Date, 3M is notified of a potential failure within thirty days of discovery, reasonable information requested by 3M is provided, and 3M is permitted to verify the cause of the failure.

8.3 Exclusive Limited Remedy

If a Reflector is proven not to have met the 3M Warranty during the Warranty Period, then the purchaser's and user's exclusive remedy, and 3M's sole obligation, at 3M's option, shall be that 3M will provide replacement of the Reflector.

8.4 Disclaimer

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