

Transportation Safety Division

# 3M™ Diamond Grade™ Reflectors Series 989

Product Bulletin Series 989  
December 2018

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## 1 Description

3M Diamond Grade Reflectors Series 989 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.

3M Diamond Grade Reflectors Series 989 is 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 Series 989 reflectors.

**Table 2.** Reflector features.

Feature	Description
Low Profile	Series 989 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 °F to 100 °F (10 °C to 38 °C)
Retroreflectivity standards	Meet photometric requirements of FMVSS 108 and SAE J594 for Reflex Reflectors. Superior angularity - beyond 60°
Warranty period	7 years

### 4 Retroreflection

Series 989 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, as defined by FMVSS 108 and SAE J594.

Observation Angle <sup>a</sup>	Entrance Angle <sup>b</sup>	Minimum for Red 989-72		Minimum for Amber 989-74	
		(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.

### 5 Durability

Series 989 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 Series 989 reflector durability:

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

## 6 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. Visit us at [www.3M.com/us](http://www.3M.com/us) and select SDS search to obtain current Safety Data Sheets.

## 7 Warranty Information

### 7.1 3M Warranty

3M warrants that 3M Diamond Grade Reflectors Series 989 (“Product”) sold by 3M for use on trucks, trailers and other vehicles in the United States and Canada will remain effective for its 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”).

### 7.2 Terms and Conditions

- o Product must be processed and applied to a vertically-mounted ( $\pm 20^\circ$ ) 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).
- o Any third-party imaging or altering of the Product not endorsed by 3M will void the 3M Warranty.
- o 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) 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 Product; (f) collisions, vandalism, or malicious mischief; or (g) an act of God.
- o 3M reserves the right to determine the method of replacement. Replacement product will carry the unexpired warranty of the Product it replaces.
- o 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.

### 7.3 Exclusive Limited Remedy

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.

### 7.4 Disclaimer

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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 IF 4.9](#) 3M™ Diamond Grade™ and Flexible Prismatic Conspicuity Markings Application Instructions for Trucks, Trailers, and Specialty Vehicles

## 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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