

Traffic Safety and Security Division

# 3M™ Diamond Grade™ DG<sup>3</sup> Reflective Sheeting Series 4000

Product Bulletin Series 4000  
May 2017

## 1 Description

3M Diamond Grade DG<sup>3</sup> Reflective Sheeting Series 4000 features the most efficient retroreflective prism design currently available from 3M for use on vertical traffic control signs and delineators to return light to drivers under a diverse set of nighttime viewing geometries encountered by the driving public. Series 4000, as manufactured by 3M ("Sheeting"), meets the stringent retroreflective requirements given in the ASTM D4956-16 standard for Type XI retroreflective sheeting.

For detailed features and benefits of the Sheeting, please refer to the 3M Traffic Safety and Security Division website (<http://www.3M.com/TSS/>).

The Sheeting is available in the following colors.

**Table 1. Product Codes by Color**

Color	Product Code
White	4090
Yellow	4091
Red	4092
Blue	4095
Green	4097
Brown	4099
Fluorescent Yellow – FY	4081
Fluorescent Yellow-Green – FYG	4083
Fluorescent Orange – FO	4084
White – Thermal transfer printable	4090TT
Yellow – Thermal transfer printable	4091TT
Fluorescent Yellow – Thermal transfer printable	4081TT
Fluorescent Yellow-Green – Thermal transfer printable	4083TT

## 2 Specifications

The sheeting conforms to all current performance requirements of ASTM D4956-16 for the Type XI retroreflective sheeting.

Additionally, the Sheeting meets the following specifications.

### 2.1 Legibility

A traffic control and guidance sign (“**Sign**”) made with the Sheeting used for both Sign background and cut-out copy will remain legible when viewed from a moving vehicle under normal day and night driving conditions by not excessively fading, discoloring, cracking, crazing, peeling, and blistering during the legibility periods in the locations as given in Table 2. Sign must be manufactured, installed, and maintained as recommended in the applicable 3M Information Folders listed in Section 9, and legibility must be assessed after the Sign is cleaned as described in [3M Information Folder 1.11](#). Legibility Period is measured from the initial Sign fabrication date (“Fabrication Date”), and varies by the location of the Sign as shown in Table 2.

**Table 2. Sheeting legibility periods by sheeting and geographic Sign location**

Sheeting	Geographic Location	Legibility Period [from Fabrication Date]
4090, 4091, 4092, 4095, 4097, 4099, 4090TT, 4091TT (Non-fluorescent Colors)	US & Canada	Up to 12 Years
4081, 4081TT, 4083, 4083TT (Fl. Yellow and Fl. Yellow-Green)	Alabama, Arizona, Florida, Georgia, Hawaii, Louisiana, Mississippi, New Mexico, South Carolina, and Texas	Up to 7 Years
	Canada and US except for the above States	Up to 10 Years
4084 (Fluorescent Orange)	US & Canada	Up to 3 Years

### 2.2 Gloss

The Sheeting has a rating of 50 or higher when tested in accordance with ASTM D523 using a 60° glossmeter.

### 2.3 Optical Stability

The Sheeting applied to a 3-inch x 6-inch sample to a test panel retains a minimum of 85% to a maximum of 115% of its initial coefficient of retroreflection at 0.2 degree observation and (-4) degree entrance angle, after being placed in an oven at 71° C ± 3° C (160° F ± 5° F) for 24 hours followed by conditioning at standard room temperature for two hours.

### 2.4 Coefficient of Retroreflection (R<sub>A</sub>)

The Sheeting applied, processed, installed, maintained, and cleaned as recommended in the applicable 3M Information Folders listed in Section 9 of this product bulletin will retain the coefficients of retroreflection<sup>1</sup> at or above the values given in Table 3 and on a traffic control and guidance Sign in the US and Canada, for the period given in Table 3 and measured from the Fabrication Date.

<sup>1</sup> Conformance to coefficient of retroreflection requirements shall be determined by instrumental method in accordance with ASTM E810 “Test Method for Coefficient of Retroreflection of Retroreflective Sheeting”, and per E810, the values of 0° and 90° rotation are averaged to determine the R<sub>A</sub> in Table 3 and Table 4.

**Table 3. Minimum Retained coefficient of retroreflection\*\* ( $R_A$ , [ $\text{cd}/\text{lx}/\text{m}^2$ ]) for Sheeting over time**

Sheeting	Years (from Fabrication Date)	Minimum Retained Coefficient of Retroreflection [ $\text{cd}/\text{lx}/\text{m}^2$ ]
4090, 4091, 4092, 4095, 4097, 4090 (Non-fluorescent colors)	On Fabrication Date	ASTM D4956-16 Type XI
	Up to 7 Years	80% of ASTM D4956-16 Type XI
	8-12 Years	70% ASTM D4956-16 Type XI
4081, 4081TT, 4083, 4083TT (Fluorescent Yellow, Fluorescent Yellow-Green)	On Fabrication Date	ASTM D4956-16 Type XI
	Up to 7 Years/10 Years**	70% of ASTM D4956-16 Type XI
4084 (Fluorescent Orange)	On Fabrication Date	ASTM D4956-16 Type XI
	Up to 3 Years	70% of ASTM D4956-16 Type XI

\*\*The retained coefficient of retroreflection applies only for 7 years after Fabrication Date for the following states: Alabama, Arizona, Florida, Georgia, Hawaii, Louisiana, Mississippi, New Mexico, South Carolina, and Texas. For all other locations the retained coefficient of retroreflection is for 10 years.

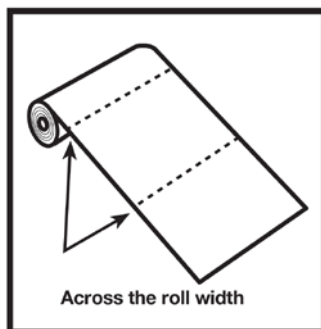
### 3 System of Matched Components

The Sheeting is compatible with a wide range of 3M screen print and digital inks, translucent films, overlay films and other processing components. For a complete list of matched components for the Sheeting, please see the [3M MCS Warranty Bulletin](#).

### 4 Physical Properties

#### 4.1 Fabrication Lines

The manufacturing process of the Sheeting results in periodic lines in the product (Figure 1). Fabrication lines may be noticeable in shop light but do not impact Sign functionality on the road either in daylight or at night under typical use conditions.


**Figure 1. Fabrication Lines**

#### 4.2 Adhesive

Sheeting comes with a pressure-sensitive adhesive that is recommended for application at temperatures of 65° F (18° C) or higher.

### 5 Processing, Storage, Packaging, and Cleaning

For processing, storage, packaging, and cleaning information, please refer to [3M Information Folder 1.11](#).

### 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. 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 warrants to the manufacturer of the Sign (“Sign Manufacturer”) that the Sheeting will meet the specifications described in section 2 of this Product Bulletin (“3M Warranty”).

### 7.2 3M MCS™ Warranty, MCS Warranty for Traffic

For warranty on screen-printed or digitally printed Sheeting, or Sheeting imaged using translucent films, please refer to the [3M MCS Warranty Bulletin](#).

### 7.3 3M Warranty Terms and Conditions

- The Sheeting must be stored, processed, applied, and maintained as described in this product bulletin and in accordance with all applicable, written 3M procedures provided in the applicable 3M Information Folders listed in Section 9.
- A failure to meet the 3M Warranty must be solely the result of design or manufacturing defect in the 3M Sheeting, and not a result of (a) outside causes including improper fabrication, handling, packing, storing, shipping, maintenance or installation; (b) non-vertical applications where the Sign is more than +/- 10° from vertical; (c) use of any material or product not recommended by 3M in this product bulletin, in the 3M Information Folders listed in Section 9, or in applicable 3M Technical Memorandums; (d) use of application equipment not recommended by 3M; (e) failure of Sign substrate; (f) loss of adhesion due to incompatible or improperly prepared substrate; (g) exposure to chemicals, abrasion and other mechanical damage; (h) snow burial or any other Sign burial; (i) collisions, vandalism or malicious mischief; or (j) an act of God.
- Claims made under this warranty will be honored only if (a) the Sign was dated with the Fabrication Date using a permanent method (sticker, marker, metal stamp, etc.), (b) 3M is notified in writing of the claim within thirty days of discovery, (c) 3M is provided with the information reasonably required to validate the claim, and (d) 3M is permitted to verify the cause of the failure.
- 3M is not responsible for any additional warranties that the Sign Manufacturer offers to its customers that is beyond the 3M Warranty.

### 7.4 Exclusive Limited Remedy

Valid claims under the 3M Warranty will receive either the Sign Restoration or Materials Replacement as detailed in Table 4.

#### Sign Restoration

During the Sign Restoration period as provided in Table 4, if a Sheeting is proven to not meet the 3M Warranty, then the Sign Manufacturer’s exclusive remedy, and 3M’s sole obligation, at 3M’s option, shall be that 3M, at its expense, will either refund the Sign Manufacturer’s total original cost of the Sign, or refabricate the Sign, including (i) Sheeting and (ii) the aluminum Sign substrate (as needed). However, 3M will not provide other hardware or labor to install the replacement Sign. The Fabrication Date of the replacement Sign will be considered to be the original Fabrication Date of the Sign it replaces under the 3M Warranty.

#### Materials Replacement

During the Materials Replacement period as provided in Table 4, if a Sheeting is proven to not meet the 3M Warranty, then the Sign Manufacturer’s exclusive remedy, and 3M’s sole obligation, at 3M’s option, shall be that 3M, at its expense, will either refund the Sign Manufacturer’s total original cost of the Sheeting, or provide the necessary Sheeting quantity to restore the Sign’s surface. However, 3M will not provide the substrate or any labor to refabricate or reinstall the Sign.

**Table 4. Sheeting type, geographic location, and type of limited remedy as a function of the age of Sign**

Sheeting	Geographic Location of Sign	Limited Remedy Period [years from Fabrication Date]	
		Sign Restoration	Materials Replacement
4090, 4091, 4092, 4095, 4097, 4099, 4090TT, 4091TT (Non-fluorescent colors)	US & Canada	Up to 7 Years	Years 8-12
4081/4083, 4081TT/4083TT (Fl. Yellow and Fl. Yellow-Green)	Alabama, Arizona, Florida, Georgia, Hawaii, Louisiana, Mississippi, New Mexico, South Carolina, and Texas	Up to 5 Years	Years 6-7
	Canada and US other than the above States	Up to 7 Years	Years 8-10
4084 (Fluorescent Orange)	US & Canada	---	Years 0-3

## 7.5 Disclaimer

THE 3M WARRANTY IS MADE IN LIEU OF ALL OTHER WARRANTIES OR CONDITIONS, 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.

## 7.6 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 the Signs or 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.

## 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.mmm.com/tss>.

## 9 Literature References

- [3M IF 1.4](#) Instructions for Interstate Squeeze Roll Applicator
- [3M IF 1.5](#) Hand Application Instructions
- [3M IF 1.6](#) Hand Squeeze Roll Applicator
- [3M IF 1.7](#) Sign Base Surface Preparation
- [3M IF 1.10](#) Cutting, Premasking, and Prespacing
- [3M IF 1.11](#) Sign Maintenance Management
- [3M PB 1170](#) 3M ElectroCut™ Film Series 1170

ASTM Test Methods are available from ASTM International, West Conshohocken, PA.

**For Information or Assistance**

**Call: 1-800-553-1380**

**In Canada Call:**

**1-800-265-1840**

**Internet:**

<http://www.3m.com/roadwaysafety>

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